Royal Society of Chemistry's Sustained Professional Development courses for teachers of chemistry

https://edu.rsc.org/teacher-pd/live-online-courses/sustained-professional-development

Introduction

The Royal Society of Chemistry's sustained professional development courses for teachers of chemistry is a suite of courses for teachers at different stages of their chemistry teaching careers. The courses include modules that cover early career teachers (ECTs); experienced teachers (including those teaching out of specialism); and those teaching curriculum topics for ages 13-16 and 16-19 years. These are currently fully-funded courses, so there is no charge to participants.

This is a comprehensive training resource, incorporating a range of different materials for use within and outside of the sessions. The different courses comprise:

- Chemistry for science teachers: Modules 1-3
- Early career teacher teaching strategies
- Experienced teacher teaching strategies
- Teaching strategies for key curriculum topics 13-16: Module 1 and 2
- Teaching strategies for key curriculum topics 16-19: Module 1 and 2

Each course or course module contains four online sessions on different chemistry topics, which are chosen to meet the needs of the target audience. These are sequenced to build knowledge and understanding. For example, Chemistry for Science Teachers (CfST) Module 1 starts by looking at practical work and the particle model before progressing to reactivity of metals, electrolysis and then quantitative chemistry. Courses are presented on an easy-to-navigate page that includes session topics and timings, an overview of what to expect and information on the target audience. For example, CfST is most suited to teachers who are relatively new to post; those who may be teaching chemistry as a non-specialist, and those who want to increase their confidence by developing a greater understanding of the subject.

Within each session there is a clear structure giving access to everything relevant, including learning outcomes (for both course and session); the Padlet, where participants and presenters interact; pre- session and in-session resources; teaching context; careers links; event support hub links; dates and surveys details; and details of next steps. Each session

(presented via PowerPoint) features a good range of activities designed for participant interaction, and these are nicely anonymised to ensure a safe space for learning. Additional resources are signposted (although some require creation of an extra login*). These resources are also categorised and include helpful teaching contexts, career links and other professional development opportunities.

Outcomes for each session are clear and links are provided to future sessions, ensuring that participants can access everything from a single place (saving them time and reducing workload). The resources are scientifically accurate and user-friendly. They are also bright, readable and engaging in appearance. Using teacher presenters increases credibility and enables participants to identify with the presenters.

CfST Module 1 – session 1

The entry page for the course is easy to use, with links and clear instructions; for example, the purpose of the Padlet is explained, along with guidance on how to use it. The outcomes are clear and the link to the pre-course survey is helpful for participants to self-assess their prior knowledge and confidence, and to focus their thinking on what they hope the impact will be. The pre-session resources comprise two videos to watch, with suggestions to note any comments and questions.

There is also a link to additional subject knowledge support. This requires creation of an additional login, but takes the participant to an on-demand course on 'Developing and using models'.* Here the participant can work through core ideas, exploring and developing understanding, and they can access additional resources and activities. Material is presented as text and short clips and the resources include downloadable pdfs; suggested practical activities, including questions and answers; activity sheets; and health, safety and practical notes.

In-session resources are broken down into the presentation (PowerPoint or pdf); details of breakout room tasks; and videos of practicals to be discussed in the session. The training has many opportunities for discussion to further involve participants and to increase engagement.

Videos are presented by teacher developers, who demonstrate and discuss each practical. They draw upon their own teaching experience to describe how to carry out the practical (from set-up through to completion and clearing up) and suggest what students could be doing at different stages. Potential hazards are also highlighted. Time is given for

participants to consider what is happening and the focus is clearly on the practical, backed by the underlying content knowledge and suggested pedagogy. The tone is friendly and the expertise of the presenters is evident.

Slides are colourful and engaging, but not over-busy and there is good use of key coding (for example, which tasks are interactive). Outcomes are clear and links are provided. Polls are incorporated to increase the interactivity of the session and there are multiple opportunities for participants to contribute, including via breakout discussions and through the chat. Outcomes are repeated as part of the session review and there is a link to the feedback survey, as well as details of the next session.

We observed the Quantitative Chemistry webinar, which was the 4th (final) webinar in the module and it was evident that participants had built a good relationship with each other and with the two presenters. Time is allowed at the start of the session for questions. When a participant asked about something from a previous session, they were given a clear answer with relevant examples – both presenters contributing suggestions and also providing a link to further material.

The session was well-structured, both in terms of content and delivery. Having two presenters, supported by the host, allowed for variety in delivery, as well as providing someone who was able to answer the questions arising in the chat (although participants were also offering responses). The polls were well-designed to provide variety and elicit misconceptions – anonymity adding to the 'safe' learning environment. Presenters gave participants time (and quiet) to focus on the polls. The teacher presenters were knowledgeable, friendly and adapted the session according to the participants' needs. (There was reference made to differences with the Scottish curriculum.) Participants were involved by asking 'how do you teach?' and pedagogy was covered alongside content.

The platform really supports the presentation, with the resources accessible simply by clicking the link, and copies were also put in the chat. (The session was made very inclusive – accepting responses in the chat as well as via polls.)

Sufficient time was allocated to the breakout rooms to allow for discussion and for feedback afterwards. Whilst it was acknowledged that not everyone would have managed to do the practical activities with their classes, there was sufficient information in the resources and videos for the discussion to be meaningful and focused.

Where (exam) questions are used, answers are provided, and the methods were worked through with participants for the majority of examples. It was evident that the teacher presenters were able to tailor the session to the specific needs of the participants, whilst maintaining the structure and consistency of the session. What was also evident was how much the participants gained from the session and how it had increased their confidence in the subject.

CfST Module 1 – session 2

It was nice to see the inclusion of some microscale activities, which save both time and resources, and which can be a useful aid to behaviour management. Many of the slides could be adapted and used directly with students to elicit misconceptions, and teacher confidence will be increased when dealing with these, since they have been covered in the session.

CfST Module 1 – session 3

The use of an animation to explain how salt dissolves (although a little robotic-sounding) provided another example of a different resource and way of tackling a tricky topic. Whilst there is some similarity to previous sessions – for example, in the use of polls and misconceptions – there is also variety through the introduction of literacy activities such as use of the Frayer model. It is impossible to cover everything in detail, so links to articles provide further exemplification where needed. (It was helpful to have links provided as well as embedding the resources.)

CfST Module 1 – session 4

Resources include the problem-solving tutor, which could help non-specialists structuring responses. This linked to one of the resources that was demonstrated in the webinar. Making time to use this encourages participants to go away and have a go, since they will feel more confident in how to access the resource.

Sustained PD course; Teaching strategies for curriculum topics 13-16 Module 1 Session 2: Structure, bonding and properties of matter

A good resource, which explains eloquently the concept of how positive species and negative species interact. The session contains interesting ideas about teaching sequences and student misconceptions for bonding, although there were few references to properties other than in the starter activity.

Again, the layout is consistent, making it familiar and easy to use. It is helpful to have slides with and without answers, since these could be utilised to assess for misconceptions in the

classroom, enabling participants to utilise their learning immediately and without increasing workload.

Sustained professional development: Early career teacher teaching strategies

Session 1: Demonstrations

The pre-course task links to an article about a book costing £40. There is nothing specific about what the participants should do and the article was printed in 2012. The links embedded in the slides didn't open and I couldn't find them elsewhere – so can't comment.

Session 2: Whole class practical

Again, the format was familiar, including repetition of specific slides that are common to all presentations, such as the RSC participant agreement – a nice reminder of participant etiquette. Learning outcomes, pre-course task and session links were all easily accessible. The minimal text reduces cognitive load, but further information such as how to engage with the article provided for the pre-course task might be beneficial, particularly for this target audience.

Sustained professional development: Teaching strategies for key curriculum topics 16-19.

Module 1 ***Module 4 Analytical chemistry – NMR with IR and MS***

For the pre-course task, the video seemed a little dated; there was quite a lot of information on the working of the NMR – perhaps it would be better to highlight the most important section, or the key points to look at. NMR is the only technique that appears to be covered; for IR and MS, links are provided for reading. Resources are linked on slides, but it would be nice to have links on the course page as well. (This would also increase consistency with other courses.)

The format of the slides is slightly different with their inclusion of aims and learning objectives and this feels more dated than some of the other modules. Methods of engagement include polls and breakout rooms and participants have a choice, depending on their confidence with outcome, of pre-course task. (This seems like a good idea and is repeated later – thereby allowing participants to get more support where required.)

Conclusion

The Royal Society of Chemistry's sustained professional development courses for teachers of chemistry is a well-designed, easy-to-use and engaging resource. There is a consistent, standard format (each course is split into (4) session topics), which aids familiarity, so reducing cognitive load. Sessions are delivered online by subject experts and experienced

teachers. Participants join the course as part of a cohort and develop a supportive relationship with both presenters and other participants. As the title suggests, the sessions within a module complement each other and take place over an extended period, allowing time between the sessions for participants to take what they are learning back to the laboratory.

The pre-course tasks provide opportunities for participants to trial their learning in their school context, thereby increasing the impact of the professional development on themselves and their pupils. The fact that there are courses for teachers at different stages of their career also allows sustained professional development over a longer period. The design of the materials is such that those who already have experience of teaching chemistry will benefit, for example by updating their knowledge, and from different approaches and suggestions from the experienced teacher presenters.

The modules are well designed to cover both subject knowledge (including, where applicable, practical content or disciplinary knowledge) and the pedagogy required to deliver this effectively. The use of tools such as resource sharing spaces, aids participant engagement and the learning environment is both safe and supportive. (This is particularly important for ECTs and those teaching out of specialism, who may be less confident initially.)

The design and delivery draw upon the EEF guidance for effective professional development and provide an easy-to-use platform for access to the courses. The resources and support materials are selected from the RSC's extensive peer-reviewed database, many of which have been written by practising teachers.

The overall result is a consistent, high-quality offer and the retention rate of the participants across the course is testament to the quality and to the success in upskilling those teaching chemistry.