

## Professional learning reflections from three newly qualified teachers

In this section, three newly qualified teachers reflect on their experience of attending Professional Learning Courses at SSERC: Jordan Summers (Design and Technology teacher), Louise Evans (Biology teacher) and James Meechan (Chemistry teacher)

### Technology probationers residential course

Jordan Summers is currently a teacher of Craft, Design and Technology at Queen Anne High School, Dunfermline in Fife. Jordan attended our professional learning course for technology probation teachers in November 2023.

The course outcomes and programme are provided below:

#### Course outcomes:

- On completion of the course, participants will be able to:
- demonstrate a range of basic skills in woodworking, metalworking, machining processes and ‘new’ technologies such as sublimation printing.
  - understand the importance of health and safety and apply the relevant safety measures within the technology workshop.
  - use a variety of teaching strategies to promote learning in technology including demonstrations, exploration of new concepts, skills, materials, and the use of real-life applications to design, problem-solve and create.
  - network with fellow professionals and explore mechanisms for ongoing support.
  - understand the range of opportunities within the wider STEM engagement portfolio which SSERC offers.
  - evaluate their own professional learning and its impact on learners.

Technology Probationers Residential course programme.

In this article, Jordan tells us more about himself and why he attended this SSERC professional learning course.

#### Education and career history

I was previously a Primary teacher for Falkirk. I am dedicated to education and made the change from primary education to secondary education to explore all stages of learning. I wanted to utilise my subject knowledge of design technology, architecture and education by expanding into the secondary sector.



Jordan Summers, teacher of Craft, Design and Technology at Queen Anne High School, Dunfermline.

sserc				Technology Probationers Residential 9-10 November 2023, SSERC, Dunfermline, KY11 8UJ PROGRAMME			
Time	Group	Thursday 9th November	Location	Time	Group	Friday 10th November	Location
09.00 – 09.30	All	Arrival and Registration: <i>Delegates will be provided with a group number (1-4) which identifies their workshop rota.</i>	Main reception, Rosalind Franklin	09.00 – 09.30	All	Registration	Main reception, Rosalind Franklin
09.30 – 09.45	All			09.30 – 09.45	All	What can SSERC do for you?	Training Room 2, Rosalind Franklin
09.30 – 09.45	All	Welcome, introductions & course outline: Alastair MacGregor and Duncan Lamb	Training Room 2, Rosalind Franklin	09.45 – 10.00	All	Wider STEM Engagement - Young STEM Leader and STEM Ambassador Programmes	Training Room 2, Rosalind Franklin
09.45 – 11.10		Introduction to micro:bit coding Kevin Reid	Training Room 2, Rosalind Franklin	10.00 – 10.55	All	Health & Safety "basics" Duncan Lamb	Training Room 2, Rosalind Franklin
11.10 – 11.30	All	Break	Training Room 1, Rosalind Franklin	10.55 – 11.15	All	Break	Training Room 1, Rosalind Franklin
11.30 – 13.30	1	Woodturning & Finishing Basics Chris Kerr	Workshop 1 Rosalind Franklin	11.15 – 13.15	3	Woodturning & Finishing Basics Chris Kerr	Workshop 1 Rosalind Franklin
	2	Metalworking Techniques & Ideas for BGE Duncan Lamb	Workshop 2 Rosalind Franklin		4	Metalworking Techniques & Ideas for BGE Duncan Lamb	Workshop 2 Rosalind Franklin
	3	Sublimation Printing – Creative Designing Alan Purves	CAD/CAM Room Rosalind Franklin		1	Sublimation Printing – Creative Designing Alan Purves	CAD/CAM Room Rosalind Franklin
	4	Basic Electronic & Soldering Skills Norman Bethune and Graeme Paterson	Main Lab, Ada Lovelace		2	Basic Electronic & Soldering Skills Norman Bethune and Graeme Paterson	Main Lab, Ada Lovelace
13.30 – 14.15	All	Lunch	Training Room 1, Rosalind Franklin	13.15 – 14.00	All	Lunch	Training Room 1, Rosalind Franklin
14.15 – 16.15	4	Woodturning & Finishing Basics Chris Kerr	Workshop 1 Rosalind Franklin	14.00 – 16.00	2	Woodwork & Finishing Basics Chris Kerr	Workshop 1 Rosalind Franklin
	1	Metalworking Techniques & Ideas for BGE Duncan Lamb	Workshop 2 Rosalind Franklin		3	Metalworking Techniques & Ideas for BGE Duncan Lamb	Workshop 2 Rosalind Franklin
	2	Sublimation Printing – Creative Designing Alan Purves	CAD/CAM Room Rosalind Franklin		4	Sublimation Printing – Creative Designing Alan Purves	CAD/CAM Room Rosalind Franklin
	3	Basic Electronic & Soldering Skills Norman Bethune and Graeme Paterson	Main Lab, Ada Lovelace	16.00 – 16.15	All	Closing Evaluations	Training Room 2, Rosalind Franklin
16.15		Close and depart		16.15		Close and depart	

# Activities & Professional Learning



I achieved my undergraduate degree from Edinburgh Napier University. Achieving my BSc in Architecture has given me a strong knowledge of architecture, science, technology and engineering.

I attended the University of Dundee where I gained my PGDE in Primary Education.

## My involvement with SSERC

During my time as a Primary teacher, I worked collegiately to write a policy for STEM education to ensure STEM knowledge and skills are included as a natural and integral part of the

curriculum planning, delivery and assessment throughout the school. I attended STEM assessor training with SSERC to assist with this. I successfully completed Young STEM Leaders tutor and assessor training. This will allow me to support this high-profile initiative throughout my career.

As a Craft, Design and Technology teacher, I want to ensure that the learners entering the classroom are excited, motivated and engaged. I always use learning and teaching strategies that encourage learners to achieve their best. Attending the SSERC training course provided me with a variety of teaching strategies to enhance my own teaching for the benefit of my learners.

I attended SSERC to increase my confidence in the workshop and to develop skills in woodworking, metalworking and machining processes. Health and safety is essential and SSERC increased my knowledge of safety measures within the workshop. The course also allowed me to network with fellow professionals and explore mechanisms for ongoing support.

For any school technician, or craft, design and technology teacher, I would definitely recommend a SSERC professional learning course – whether it be to upskill or refresh linked to health and safety of specific aspects of the curriculum. The staff are very professional and enthusiastic and my time at SSERC was so worthwhile. >>



## Science probationers residential course

The Probationers residential Course in December 2023 was an excellent opportunity to connect with other NQTs as well as explore different practical activities across the different Sciences.

The programme was an excellent balance of fun and engaging practicals and useful discussions around the real-life application of teaching points. It was well organised, easy to sign up for and the facilities were easy to find.

The 2-day course was billed as an opportunity to explore practical activities across the science spectrum while following the National curriculum. This meant we could gain hands-on experience in all science disciplines rather than just our own; it allowed us to do exactly what we would be asking our students to do and therefore experience any potential pitfalls.

My science background is in Zoology, so the opportunity to conduct chemistry and physics practicals with subject specialists was especially useful.

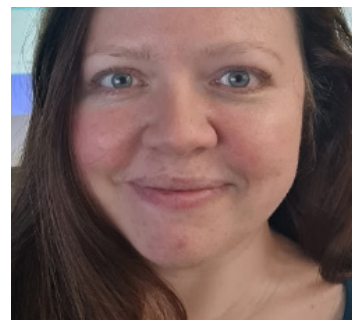
### The course

The first day started off well; the centre was easy to find as was parking, the staff member welcoming

us was extremely friendly and the building had accessibility equipment readily available. We were given the chance to mingle with the others who were attending the course and I even reconnected with a friend I had attended university with!

The welcome session explained the schedule for the two days very well and before we knew it we were off to our first workshops.

The main focus for the Chemistry and Biology workshops was micro-science, which is an excellent approach for schools with ever dwindling budgets. The skill in condensing practical activities down to such small levels while maintaining educational value cannot be understated, and while we were conducting experiments with small volumes of equipment we were not sacrificing any learning points or information. The resources included instruction sheets that are available on the new SSERC website for schools to print off, laminate and



Miss Louise Evans, NQT Ross High Tranent, East Lothian.

use themselves which removes a huge chunk of time – which teachers have so very little of.

There are several benefits to the micro-scale science practicals but for me the major ones are the speed and ease of set up and clean up time. Teaching periods fly by, so having instructions on a sheet for pupils to refer back to as they go and being able to use considerably less equipment means I can focus on the learning portion of my lesson far more easily and less time on organising students and equipment.

It also means that I can better support students who need a little more help while allowing students who are more confident and capable the opportunity to stretch themselves and move onto the next example – with instructions.

I was impressed with the use of petri dishes to illustrate the production of gases such as ammonia, which can be too toxic for classes. Scaling down the volumes of chemicals used



Day 1		Day 2	
09.15 - 09.30	Arrival and registration	09.15 - 09.30	Arrival and registration
09.30 - 09.45	Welcome, introductions & course outline	09.30 - 11.00	Session 6: Group A: Biology (Microscale Biology) – Meeting room Group B: Chemistry (Demos – It's more than just bangs) – Lab
09.45 - 11.15	Session 1: Group A: Biology (Photosynthesis) – Lab Group B: Chemistry (Microscale Chemistry) – Meeting room	11.00 - 11.15	Break
11.15 - 11.30	Break	11.15 - 11.45	Session 7: Data Science
11.30 - 12.00	Session 2: Health & safety basics for science teachers – Unit 1	11.45 - 13.15	Session 8: Group A: Physics (Teaching forces and other tricky stuff) – Unit 1 Group B: Biology (Microscale Biology) – Meeting room
12.00 - 13.30	Session 3: Group A: Chemistry (Microscale Chemistry) – Meeting room Group B: Physics (8 simple experiments) – Unit 1	13.15 - 14.00	Lunch
13.30 - 14.15	Lunch	14.00 - 15.30	Session 9: Group A: Chemistry (Demos – It's more than just bangs) – Lab Group B: Physics (Teaching forces and other tricky stuff) – Unit 1
14.15 - 15.45	Session 4: Group A: Physics (8 simple experiments) – Unit 1 Group B: Biology (Photosynthesis) – Lab	15.45 - 16.00	Evaluations & Depart
15.45 - 16.15	Session 5: Wider STEM engagement with the Young STEM Leader Programme and STEM Ambassadors in Scotland Rosalind Franklin Teaching Room		
16.15	Transfer to hotel (Pitbauchle House)		
18:00	Dinner		
19:15 - 20:30	Evening Session: Lion's Lair		

# Activities & Professional Learning



and enclosing the reaction in a petri dish allows students to explore the reactions to gain a more complete understanding of the processes involved.

My school already utilises some micro-scale practicals (no doubt from other colleagues attending SSERC courses) but I used the electrolysis practical with my Science club, who were very excited to see the range of reactions. If we had not used the small volumes of chemicals we would likely have only been able to explore a couple of different reactions. With this activity we could compare several chemicals and see colour changes as well as precipitates formed – all in a twenty minute lunch club! Our technicians also found it easy to adapt and set up and the chemistry department are interested in including more of these types of experiments in our curriculum.

The physics workshops were great fun and the tutor had a great way of getting people engaged in the

concepts we were discussing. Most of the activities could be made using household items and can be used to demonstrate physics concepts to great effect. I was also intrigued by the suggestion that we suggest a practical activity as homework rather than written, I think that with the focus on attainment it is easy to forget that science is essentially curiosity given action and we can inspire our students in that way.

The Biology workshops were of special interest to me being a Biology teacher, and I liked the consideration of running the experiment at either BGE level or scaling up the information and skills required for a National level class. There was also a focus on sustainability and an eye towards disposal of samples after use. There was specifically a discussion around plants that are suitable for the experiments but are native to the UK rather than invasive species that could cause harm if improperly disposed of. It would be a good talking point to introduce to students as well, promoting their sense of connectivity and responsibility for our natural environment and community.

Being able to show the effects of light intensity on photosynthesis in one test tube means that every student would have the chance to conduct their own investigation, normally due to budget and time constraints and equipment availability practical's



have to be done in pairs at the very least. Again the activities were easy to set up without sacrificing any teaching points, which leaves time for class discussion and promoting the students independent thought processes, not always easy to do in a practical lesson.

Arguably the highlight of the course was the carousel session of chemistry practicals, there were colour changes, fireworks, rockets and methane bubbles to name just a few. It was a good demonstration of the variety of activities available to inspire students while teaching and having fun.

The course was a lot of fun of course, but also inspired me to think about how I include practical's in my classroom and gave fantastic ideas of how to expand the options without sacrificing budget or making it a demonstration. There was constant referral and connection to the National Curriculum Es and Os or Benchmarks as well as consideration of IDL and Sustainability across the whole course.

I would recommend any teacher or technician make use of the SSERC resources that are freely available on the website. I would also thoroughly recommend the course to any probationer and very much look forward to attending other course with SSERC throughout my career, they provide inspiration as well as support to my own learning and my teaching practice. >>



The physics workshops were great fun and the teacher had a great way of getting people engaged in the concepts we were discussing.

## Science probationers residential course

**When I was old enough to read, I became fixated with my family's illustrated encyclopaedia. This led to an early fascination with science, an interest that would have remained purely recreational, were it not for the encouragement of my teachers. This encouragement pushed me to pursue science learning throughout my life.**

I studied chemistry at the University of Glasgow, graduating with a BSc (Hons) in 2021. Recalling fond memories of my experience at school, and eager for a job that would provide challenge and emotional reward, I decided on a career in education, returning to Glasgow to earn my PGDE Chemistry teacher qualification.

For probationer teachers, full of enthusiasm for our new careers but lacking the experience and the

pedagogical 'toolkits' of our more senior colleagues, we still have a tremendous need for professional development that equips us with the engaging lesson formats, practical knowledge and confidence to deliver high-quality teaching.

The Science Probationers' Residential provided by SSERC was exactly the kind of impactful professional learning that my peers and I needed. The 2-day course took place at SSERC HQ in Dunfermline and was aimed at supporting science probationers with delivery of practical learning, familiarising us with SSERC's STEM engagement programmes, as well as providing networking opportunities with peers and the SSERC team.

### **The Learning Outcomes for the course were:**

- demonstrate an enhanced portfolio of ideas for practical work both within and outside their own subject specialism;
- use a wider variety of teaching strategies to promote learning in science including demonstrations and scientific enquiry;



James Meechan is a probationer chemistry teacher at St. Ninian's High School, East Dunbartonshire.

- exemplify the importance of contemporary science and its applications in the context of the curriculum;
- network with fellow professionals and explore mechanisms for ongoing support;
- understand the range of opportunities within the wider STEM engagement portfolio which SSERC offers;
- evaluate their own professional learning and its impact on learners.

After the morning registration, we received a warm welcome from Alastair MacGregor, a brisk introduction to SSERC, its role in Scottish education and the training and resources it provides to science teachers. We then transitioned to the biology, chemistry and physics workshops.

Annie McRobbie and Margaret Louis' photosynthesis session revealed how different types of seaweed such as bladderwrack can be used in the classroom for impressive experiments to demonstrate the biological process to learners. As well as covering the relevant biodiversity and body systems Experiences and Outcomes, the session also made links to Scotland's latterly expanding seaweed aquaculture industry. >>>



The microscale biology workshop, led by Annie and Margaret.

# Activities & Professional Learning

It is an unfortunate realisation for probationers that many school science departments are forced to curtail some chemistry experiments due to budget constraints. The microscale chemistry session led by Chris Lloyd was in many ways a revelation. Microscale chemistry has quietly grown in adoption over the last two decades. It is an ethos of designing experiments to use tiny quantities, low concentrations and small volumes of chemicals, with the ultimate goal to minimise the financial cost of material in science classrooms, without compromising on learning. For example, a precipitation reaction using just two drops of dilute potassium iodide and lead nitrate solutions to produce lead iodide.

Linking closely to this session, was the microscale biology workshop, again led by Annie and Margaret. I was particularly impressed by the microscale titration experiment, and how it could make this analytical technique easier for learners to conceptually grasp. A perennial frustration of biology experiments, the lengthy waiting periods to complete, only to yield undesired results, are also mitigated by the microscale conditions, which are usually faster to complete and better suited for repeat measurements - extremely useful for learners working on assignments.

Both these workshops categorically demonstrated the versatility of microscale experiments and apparatus. Not only will they keep costs down, it also makes practical activities safer, easier to manage, minimises waste, reduces time spent repeating measurements and cleaning apparatus, and can be linked to environmental sustainability.



The physics workshop.

One aspect of science teacher practice that I think every new teacher seeks to master, is the 'art of the demonstration'. Chris' workshop on chemistry demos was exactly what my colleagues and I needed: a whistlestop tour of exciting and - quite literally - explosive teacher demonstrations, achieved with common lab materials and equipment. It took little imagination for us all to appreciate the buzz and enthusiasm for science that all of these demonstrations could generate in a classroom.

The physics workshops delivered by Norman Bethune at the residential also deftly exhibited the value of demonstration. In the first workshop, modestly titled *8 simple experiments*, our mentor revealed how a rubber balloon can illustrate electrostatic induction, Newton's third law of motion and the expansion of the universe. And that was just three of the experiments. The second physics session, by contrast, focused on the teaching of forces and navigating the cognitive conflict the concept can present to learners. I certainly will make a more conscious effort to avoid teaching forces by trying to explain what they are, but rather teach learners *what* they do to objects.

Some other non-subject specific sessions are equally worthy of praise. Chris Lloyd's talk on health & safety clarified the responsibilities of employers and employees, the importance of risk assessment, and helpfully pointed us to the wealth of relevant information and guidance provided by SSERC. Graeme Rough gave a comprehensive presentation on SSERC's myriad wider STEM engagement initiatives, such as the Young STEM Leader Programme, STEM Ambassadors in Scotland and Nuffield Research Placements. These programmes provide young learners with exciting new contexts to STEM learning beyond the classroom.

Norman led another session on data science, condensing this topical and rapidly evolving discipline into an informative and engaging exercise. Finally, John Cochrane's *Lion's Lair* evening session was as creatively fruitful as it was entertaining, and I believe everyone in the room could not wait to repeat the lesson format in their own classrooms. >>

# Activities & Professional Learning

I would emphatically recommend the Science Probationer Residential to every future probationer in Scotland. This was probably the most impactful and engaging professional learning I have received so far in my career. Upon returning to my department, I immediately wanted to share what I had learned with colleagues, and set up ways for implementing what I had seen at SSERC.

One moment I kept thinking about after the residential, was when Norman prepared to do the famous – or infamous – trick of holding a glass of water upside down above his head, with nothing more than a beer mat and surface tension keeping his head dry. Whilst he did this, he exhorted us all to embody total



and unshakable faith in science in our lessons. We must step into our classroom with the confidence in our subjects that they deserve.

This is the most succinct way I could summarise the feelings of my colleagues and I at the conclusion of the Science Probationer Residential. These were two days packed with professional wisdom that the SSERC team have distilled from decades of experience. At this stage in our careers, we value the refinement and knowledge afforded by that experience. This training has enabled us all to bring novel, engaging practice to our lessons, with the added confidence that these have been tried and tested by senior teachers. With the insights provided over the residential, we can all feel to have expanded our teaching ‘toolkits’ and deliver the best lessons we possibly can. <<

## Microbiology matters

The Microbiology in Schools Advisory Committee (MiSAC) promote the teaching of microbiology in schools and colleges.

Annually, they run a poster competition for schools across the UK, focused on a specific area of microbiology; the 2024 competition encouraged learners to explore *Neglected Tropical Diseases and Climate Change*. The organisation offers a range of learning and teaching resources, including scientific articles that complement the Scottish curriculum.



To find out more, visit their webpage [www.misac.org.uk/browse-entire-collection.html](http://www.misac.org.uk/browse-entire-collection.html)