

*Place based learning in skills in schools  
and science teacher education  
programmes: student perspectives to  
moving learning online due to Covid-19*

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# Place based learning in Skills in Schools and Science Teacher Education programmes: student perspectives to moving learning online due to Covid-19

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## INTRODUCTION

The development of science teachers requires lab-based, inquiry based and place-based learning in universities and schools. This is inherent to understanding the nature of learning science and associated pedagogy. Place based learning requires the development of teaching skills through working in a community of practice.<sup>1</sup>

In March 2020, with the outbreak of Covid-19 and lockdown, teacher education programmes had to adapt to a blended learning approach. This project explores that journey across three teacher development programmes within one Higher Education Institute (HEI). The programmes were SKE (Subject Knowledge Enhancement), Skills and Schools and PGCE Secondary Science. It unpicks how the participants responded to that provision and how the TEL (technology enhanced learning) pedagogy evolved.

This paper discusses the approaches taken in overcoming the challenges to deliver place-based learning online, whilst maintaining the essence of social learning and collaborative learning.<sup>2</sup> It draws on Salmon's five stage model of e-learning to describe the process and presents insights from a student perspective, drawn from feedback and focus groups.<sup>3</sup>

The HEI TEL strategy was to make use of MS Teams and Blackboard VLE. Laboratory work and school experiences made use of a combination of videos, home labs and group meetings and taught sessions, which will be discussed.

The unique contribution of this research is that it is a collaborative project that can allow some comparisons to be drawn. Offering lessons to be learnt in improving online provision and TEL pedagogy. The research questions focus on the participants perceptions of learning and reflections on learning.

## LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The theoretical framework underpinning this research relates to social, collaborative learning as well as the development of communities of practice. This theoretical approach not only underpins the approaches taken to respond to the delivery of three teacher education programmes at one HEI, but also underpins the methodology for the data collection in terms of the focus groups, described in the next section.

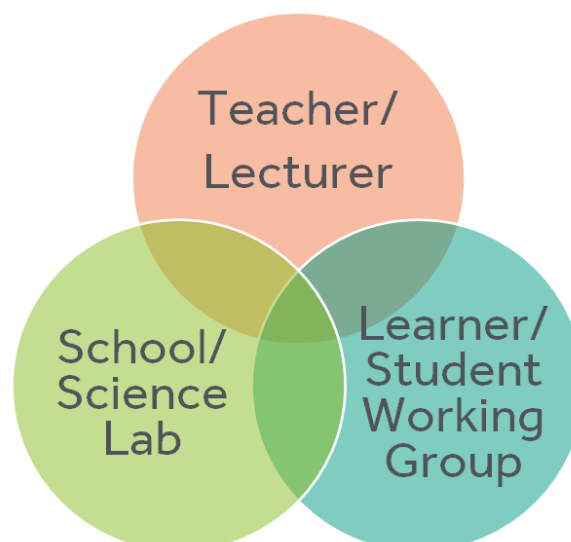
### Communities of Practice & Collaborative Learning:

Learning is a social process where there is a relationship between context and meaning.<sup>4</sup> This is because learning is located within a relationship between that context and meaning and is inseparable from that social practice.<sup>5</sup> This is particularly the case in the learning of science, where the learning involves

engaging in practice through participation and critical reflection.<sup>6</sup> Learning related to science and Skills and Schools teacher education takes place in a school as well as a laboratory. Over recent years, pedagogical approaches have shifted. The Joint Information Systems Committee (JISC) viewed learning as acquiring competences,<sup>7</sup> constructed through understanding, individual or collective, through dialogue and situated learning in a social practice,<sup>8</sup> again particularly important for Skills and Schools and teacher education. It is the interactions between the people and structures (school and the labs) that influence each other and facilitate the knowledge generation. If the learning is situated, the participants can learn through legitimate peripheral participation as well as through the Zone of Proximal Development (ZPD). Vygotsky's ZPD requires a learner to be assisted with the development of their understanding and learning through an area of self-regulation.<sup>9</sup> The learner receives constructive feedback that guides and moves their learning forward beyond the ZPD.

In this study it was important that social learning environments were established, even though students could not be engaged in schools or laboratories due to Covid-19. This allows students to exchange ideas with their tutor instigating the discussion topic. These groups engaged and collaborated throughout their programmes. The groups took on responsibility for setting up meetings to engage in discussion and feedback. Collaborative learning combines the pedagogies of constructivism and social learning to ensure richer interactions take place between learner, their concepts and their practice. For the SKE and PGCE the practical activities required collaboration for students to develop their understanding of the subject knowledge more deeply. They were able to share and discuss and think about conceptual understanding. With the SKE, this practical learning had to take place online, whilst in the science laboratory for the PGCE. There is still considerable debate as to the importance of the laboratory for learning,<sup>10</sup> both the PGCE and SKE courses have always included laboratory experience in order to prepare students for teaching in a laboratory once qualified.

Figure 1 represents the changes made to the communities of practice (COP) due to this transition to online. Figure 1a shows the original COP with students and teachers working in the lab or school. Figure 1b is the COP required for this transition that worked alongside the Figure 1c COP. Figure 1c COP has the addition of the online environment that replaced the school or laboratory.



*Figure 1a: Original Communities of Practice*

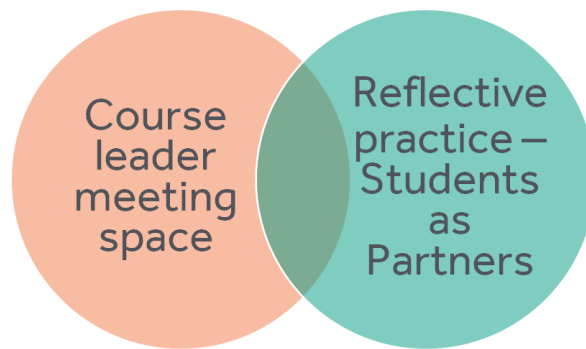


Figure 1b: Transition Communities of Practice

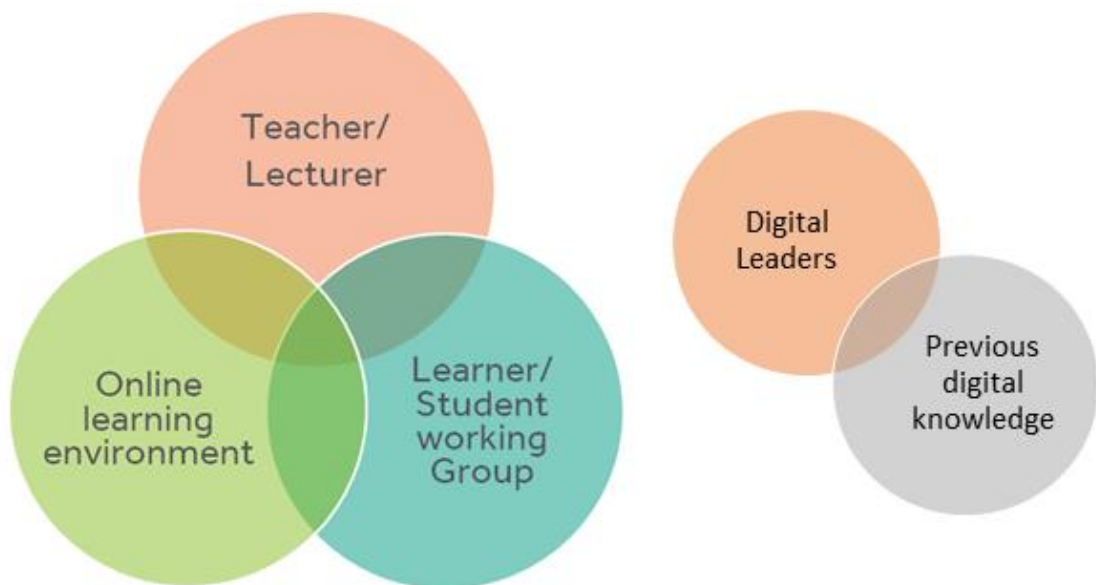
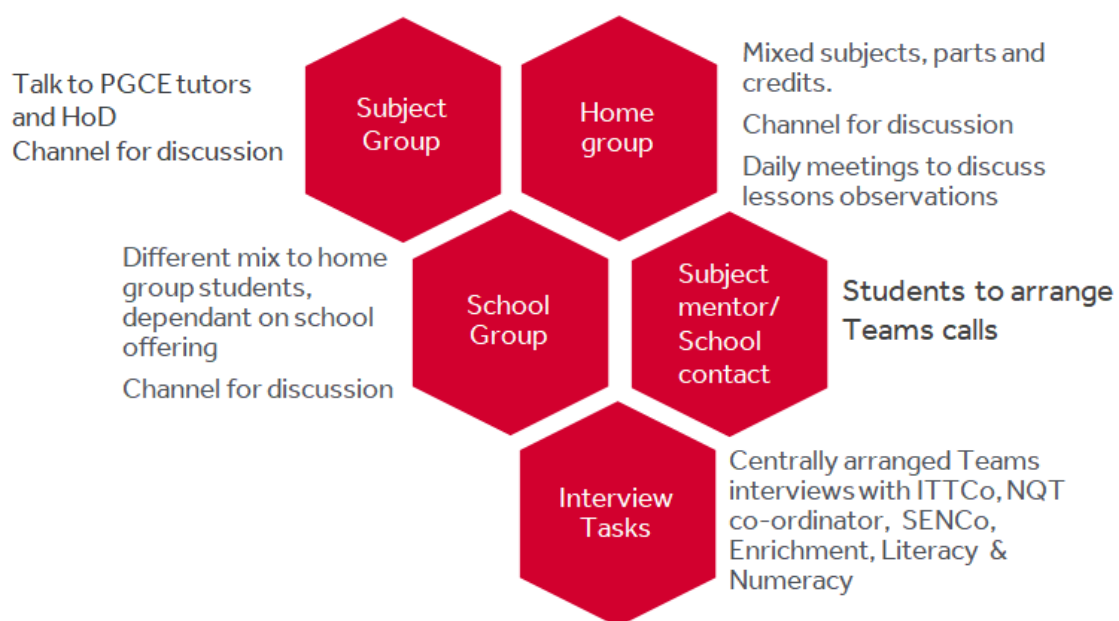


Figure 1c: Online Communities of Practice



*Figure 2: Skills in Schools Group Organisation.*

Learning Outcomes for Skills in Schools include development of collaborative skills. Explicit opportunities were provided to replicate being in school, observing lessons, discussing with peers, interviewing key staff (Figure 2).

### **E-Learning & Technologies:**

Gilly Salmon presents five stages to teaching and learning online that helps to explain how that learning is facilitated and how learning is effectively scaffolded in this online context. It provides a framework for enhancing active and participative online learning; describes the process for the moderator (teacher) and learner (student); describes how to motivate online learning whilst building on e-tivities; pacing e-learning through stages of training and development; and how to e-moderate. This is described retrospectively in the results and discussion section below.

The technology used was driven by the University strategy, training available and ease of use or familiarity. We attended CPD sessions and conducted meetings via MS Teams. Bb Collaborate was not as user friendly. Blackboard was used in a conventional way for resources and course content. MS Teams facilitated student group meetings and tutorials. MS Teams was used for conducting the live practical sessions, or introductions to course content. Table 1 shows an overview of the use of technology across the three programmes.

	<b>Skills in Schools June 2020</b>	<b>SKE June 2020</b>	<b>PGCE September 2020</b>
<b>Instruction for technology access</b>	Screencast walk throughs Live demo	Email information and screencast	Screencast walk throughs Live demo
<b>Instruction for assessments</b>	Screencasts to support written instructions	Collation of e-portfolio through Bb submissions	Screencasts to support written instructions
<b>Practical lab work</b>	N/A	'care packages' video demo Home lab work PHET and GoLabz simulations	Lab work in labs with social distancing and control of numbers. Lab work adapted.
<b>Lesson Observations</b>	Use of training videos	Malmesbury School Videos of Required Practicals	Was in schools as normal
<b>Pre-recorded 'lectures'</b>	Flipped learning	Flipped learning	Flipped learning
<b>Live lectures/seminars</b>	To facilitate discussion & deliver content	To facilitate discussion & deliver content	To facilitate discussion & deliver content
<b>Progress Assessment</b>	Daily e-journal	Blackboard upload	E-portfolio

*Table 1: Overview of use of technology*

## **METHODS**

### **Design & Methodology:**

The research design mirrored that of the development of the communities of practice. It was a collaborative and iterative process that helped to explore student perspectives due to a shift to online learning. It involved gathering feedback from undergraduates and post-graduates engaged in three programmes: Skills and Schools, SKE and PGCE Secondary Science. An online Microsoft Form was completed by all students to provide initial feedback, and then those who consented were asked to engage in a Focus Group. These focus groups helped to draw out greater insights, providing rich descriptions and qualitative data. The thematic analysis of the data helped to draw out key aspects in terms of what students had found useful and things that were seen as issues, so that this feedback could help academics improve their programme development the following year.

### **Participants & Sampling:**

All the students from three programmes (120 Students) were asked to complete an online survey. 26 students (+20%) consented to engage in the focus groups and these were split into four groups. Each group (6-7 students per group) were asked to review the same discussion points (appendix 2), which were developed from the initial feedback. The students were undergraduate first/second year students (age 18-20) and post-graduates (age 24-48).

### **Design & Methodology:**

The project took place from January 2021, with focus groups in February 2021, and paper submission in April 2021. The programmes ran from March 2020 for the SKE and Skills and Schools Programmes, and September 2020 for the PGCE Secondary Programme. The research instruments included the use of MS Forms for initial feedback (January 2021). Then follow up focus groups, to last no longer than 45 minutes, to allow students to engage in richer conversations (February 2021). A decision was made to use MS Forms and focus groups through MS Teams as we were still in a situation where engagement with students was online.

### **Research Instruments:**

The project took place from January 2021, with focus groups in February 2021, and paper submission in April 2021. The programmes ran from March 2020 for the SKE and Skills and Schools Programmes, and September 2020 for the PGCE Secondary Programme. The research instruments included the use of MS Forms for initial feedback (January 2021). Then follow up focus groups, to last no longer than 45 minutes, to allow students to engage in richer conversations (February 2021). A decision was made to use MS Forms and focus groups through MS Teams as we were still in a situation where engagement with students was online.

### **Data Analysis:**

Thematic analysis<sup>11</sup> was used to draw out the key themes from the focus group discussions. These were then categorised as the issues raised, the things the students liked and the aspects for further development. In addition, the academic staff reflected on what they would continue to do in the next academic year.

### **Ethics:**

Ethical Approval was sought following BERA Guidelines and University procedures. Students were briefed about the project and required to give their consent. Students were invited to complete the MS Form and attend the focus groups via email. The main ethical consideration was that we did not have an academic who had taught on the programme introducing the focus group. It was also important, where possible, that the students led the focus group discussion and allocated a student moderator at the beginning of that focus group session to lead. This provided all participants with the opportunity to contribute.

## RESULTS AND CONCLUSION

In removing a key element of the COP (science laboratory and school) we needed to ensure that students still had the same opportunities to collaborate with all the key aspects of that practice they were learning about. The students stated that they:

*‘... particularly enjoyed the collaborative engagement with both my colleagues and our tutors. Given that these were unusual circumstances, it was important to maintain a strong team spirit as I felt that this gave us all mechanisms to cope with those times where things were daunting, confusing etc... but also it gave us all moments to share successes and achievements, all of which helped progression through the course. I felt that we had the right blend of help and support from our tutors, with good input balancing space for us to collaborate effectively.’*

Student Feedback initial evaluation

*‘I enjoyed "meeting" my SKE buddies and getting to know my new colleagues. I enjoyed A Level Practical Week and found some of the online tools for experimentation and demonstrating experiments very helpful’*

Student Feedback initial evaluation

22/100 responses on MS Forms showed students’ excitement of doing practical work, and the experience of using things online that they could then use in their own teaching practice:

*‘...the excitement of receiving the pack of goodies through the post was real and I enjoyed that element of the program and it's been genuinely useful. I've used some of those experiments that we did in the classroom and as PERSON B said virtually as well.’*

Student Feedback MS Form

*‘...some of the online simulations that we used in our SKE we've used (with pupils). I certainly have used them while we've been doing online learning last half term, like the PHET simulators and things like that...’*

Student Feedback MS Form

The students who consented to engage in the four discussion groups (5 participants per group = 20 participants) highlighted the benefits of the online group engagement:

*‘I just wanted to say, really. It was it was a credit to the team that delivered the SKE that it got my subject knowledge to a level where it needed to be, so I know that the people had to react quickly to deliver the program in a different way...’*

Student Feedback Focus Group

Table 2 shows an overview of aspects students found useful and key issues. The third column highlights suggestions for improvement.

Programme	Useful	Key Issues	Suggestions
<b>Skills &amp; Schools</b>	<ul style="list-style-type: none"> <li>• Training to work online at the start</li> <li>• Easy instructions &amp; structure clear</li> <li>• Working in groups</li> <li>• Flexibility as to when to meet</li> <li>• Interviewing the teachers</li> </ul>	<ul style="list-style-type: none"> <li>• F2F would achieve <u>better quality conversations</u></li> <li>• Videos outdated</li> <li>• Independent Learning</li> </ul>	<ul style="list-style-type: none"> <li>• <b>More support for enabling rich conversations online with ‘strangers’</b></li> <li>• <b>Source new video material</b></li> <li>• <b>Ensure students understand when to work collaboratively</b></li> </ul>



			and when independently
<b>PGCE</b>	<ul style="list-style-type: none"> <li>• If completed SKE found it easier to navigate Bb and work in small groups</li> <li>• Staff responded and improved provision</li> <li>• Fruit groups</li> <li>• Week by week organisation on Bb</li> </ul>	<ul style="list-style-type: none"> <li>• Navigating Bb across different areas – PS, Subject, Assignment etc...</li> <li>• Whole cohort not as well laid out as subject – meeting sessions/ break out groups</li> <li>• Two versions – pre-pgce and pgce</li> <li>• SKE laid out different to PGCE</li> <li>• No time to socialise/chat during taught sessions even when F2F</li> <li>• PS Sessions too long for online</li> <li>• Amount of screen time difficult to manage – particularly if learning difficulties</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Pre-tutorial/STREAM on how to use and navigate Bb areas</b></li> <li>• <b>Scheduled time just to catch up</b></li> <li>• <b>Consider screen time, chunking up, slimline content</b></li> <li>• <b>Clear instructions in ONE place for online sessions, how to join etc..</b></li> </ul>
<b>SKE</b>	<ul style="list-style-type: none"> <li>• Clear structure and materials on Bb signposted</li> <li>• Short guidance videos</li> <li>• Resource packs sent home for home lab work</li> <li>• Small groups for group task/tutorials</li> </ul>	<ul style="list-style-type: none"> <li>• No Lab Practical</li> <li>• Those with families found it difficult to complete work</li> <li>• During practical weeks, there was a lot of other content to cover</li> <li>• Expectation of being taught Subject Knowledge – core content</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Develop initial skills to work online</b></li> <li>• <b>Priorities CORE content and ADDITIONAL content and make explicit</b></li> <li>• <b>Key Learning Outcomes</b></li> <li>• <b>Focus on Practical during practical weeks</b></li> <li>• <b>Week by week on Bb</b></li> <li>• <b>Schedule taught content</b></li> </ul>

*Table 2: Overview of key issues, useful aspects and suggestions*

### What we learnt:

We learnt that even with these limits on engagement related to accessing schools and science laboratories brought about by Covid-19 we were still able to engage in an integrated learning model. The one thing that had changed was ‘place’. Figure 3 shows the integrated learning model underpinned by constructionism, adult learning theory,<sup>11</sup> reflective practice,<sup>12</sup> collaborative and social learning.<sup>13</sup>



Figure 3: Integrated Learning Model

Academics engaged with students through breakout groups and students engaged with students through group discussions. Students shared their inputs through CHATs with photographs, short videos or commentary. Students took responsibility to lead sessions, to set up sessions and collaborate. Work based learning was taking place through these aspects of shared practice, home labs and virtual labs.

We were able to reflect on Gilly Salmon's 5 stage model for e-learning online<sup>3</sup> and demonstrate these stages had been followed. Next year, when designing e-tivities we will use Salmon's e-tivities template to facilitate this process.

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