Case Study: United Classroom Proof of Concept

What was the purpose of the project?
Building on what we knew from previous toe-in-the-water projects around shared teaching via video conferencing, this proof of concept project was designed to test the hypothesis that it is possible to teach and to learn using a predominantly online model, to the required standard in the latter years of Secondary schooling. This is a necessary pre-cursor to scaling up the approach to offer KS5 courses to pupils around the Group and hence broaden the curricular offer our schools are able to make as well as increasing the quality of specialist teaching these children can access.

What was the story/ what did you do?
Informed by the need to minimise risk of failure and maximise the value, both for the project and for the children involved, the following approach was taken:

- The subject to be studied was selected because it is not commonly taught in our schools, and therefore was attractive to the participants and not simply a sub-optimal replication of what is already possible via face to face. The decision to offer GCSE Astronomy was also determined by availability of suitable teaching staff;
- A co-curricular delivery model was used, so as not to overly disrupt pupils' education and hence life chances. For the same reason, a GCSE rather than an A Level course was chosen. Taught sessions took place on Tuesdays from 4pm;
- The selection of participants was careful to look at adequate mathematical and independent learning skills, due to the nature of astronomy and the necessity for isolated self-study at points in the weekly cycle;
- The technological solution was deliberately simplified, with browser-based tools (Google Apps for Education - GAfE) selected and a common resilient hardware solution (Chromebooks) used. This reduced the potential local causes of failure to the school's internet connection, wireless and wired infrastructure. The participating schools were also selected based partly on their technical infrastructure and support;
- A modified 'MOOC' approach was designed, adding a synchronous lesson element and wrap-around social support layer to scaffold the process for pupils and reduce the risk of drop-out;
- Approximately half of the budget was spent on release time for the two teachers leading at each end, to enable development of materials, experimentation with the platform and face-to-face planning to take place. Previous projects have, in my experience, spent far too much on technology and not enough on the people leading its use.

Live lessons were taught weekly via Google Hangouts and utilised a variety of Google tools, notably Docs (for written/ collaborative tasks), Slides (for teaching and information transmission) and Classroom (for task issue/ feedback). Lessons were recorded using a paid-for system called Panopto, which allowed pupils to access videos of lessons from a variety of devices.

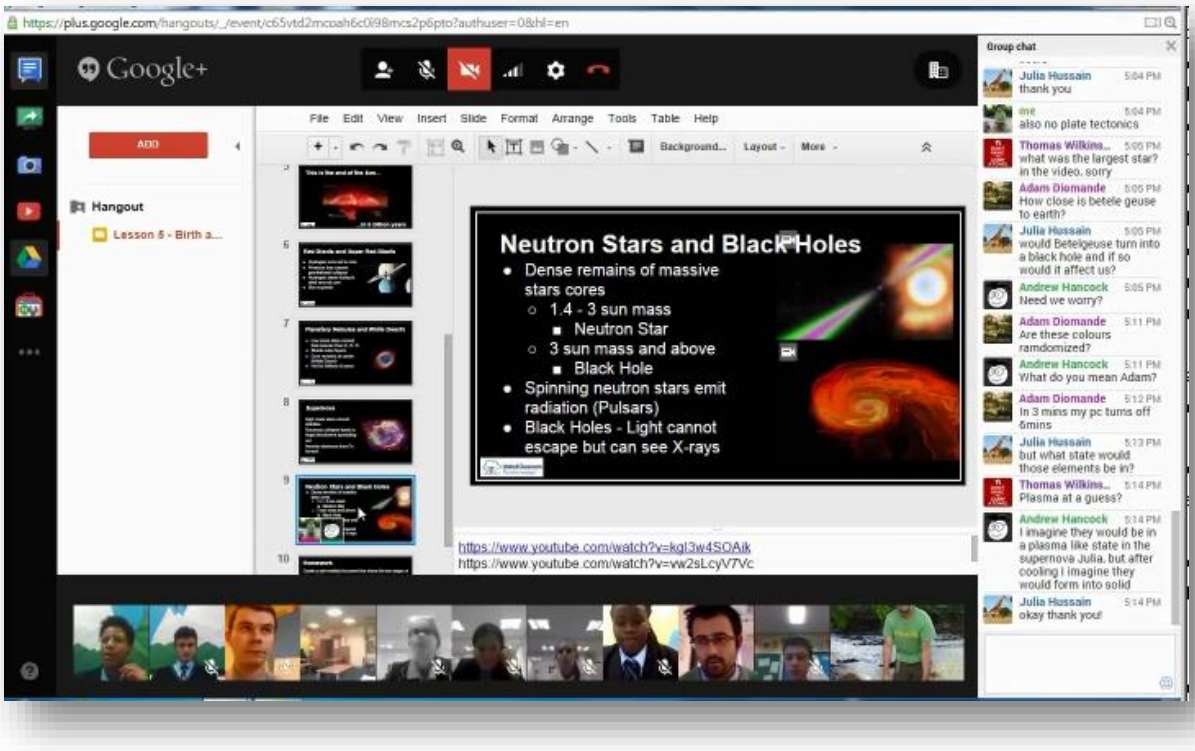
An online support session was offered one night per week, in which one of the two teachers was available online to help students with their tasks. Tasks were completed by pupils either independently or in virtual collaboration with peers. Work was submitted via Google Classroom, with the teacher giving detailed feedback in the form of comments and the expectation that students would continue this dialogue. In preparation for the week's lesson, pupils were often given pre-session content to read/ watch/ listen to.

Who was involved?
Four pupils from Surbiton High School and four pupils from Lambeth Academy participated in the course developed and written by Dr Robert Bastin of SHS. Andrew Hancock (a chemistry teacher) assisted in lesson delivery from the Lambeth end. Bruce Wilson (Technology Partner) helped ensure things went smoothly, and the author was occasionally present in live lessons, coordinated procurement and the GAfE environment and provided an overall steer to the project.

What went well?
Beginning the course with a face-to-face meeting (the staff and students visited the Royal Observatory in Greenwich) helped to create trust between all participants, something which is often lacking in online-only groups. This approach should be a feature of any future courses.

Students embraced the multimodality created by combining traditional didacticism with more open-ended, collaborative and self-study methods, both mediated by an online environment; they weren't fazed. Their use of questioning in this environment proved very similar to that seen in face-to-face lessons, perhaps with slightly more openness due to the subtler back-channel as well as the option to speak. Their success may be partially explained by the consistent structure of the course and the use of a mixture of media and activity types, methods of course design and organization linked with increased student engagement and autonomy when learning online[1]. In an end of term survey, all students disagreed or strongly disagreed with the statement 'The chat feature running down the right of the Hangout isn't useful to me'.

The ability to do group/ paired working with shared documents just as you would with sugar paper around a desk, and with equal simplicity, meant that the collaboration concept mapped very well from pupils' experience of physical classrooms to this virtual one. Pupils were happy to answer others' questions when they had an answer, and this was particularly noticeable through the chat back-channel. It is a noted feature of online learning that the more advanced members of the group seem to gain satisfaction from offering their knowledge to less knowledgeable peers. Martin and Parker[2] found that 'These questions benefit the students asking them as well as the entire class because every student can see the questions. This builds critical thinking skills by causing them to reflect on questions and posit answers to them for themselves'. 6 out of 8 students agreed or strongly agreed with the statement 'It is useful to be able to collaborate with other students'.



The platform also proved that advanced pedagogical techniques were possible, just as they would be face-to-face. For example, the live switching of sharing rights mid-task to enable different roles to be played by different students made it possible to alter group dynamics on the fly, if the teacher saw the need.

[1] Borup, J, Graham, C & Drysdale, J., *'The nature of teacher engagement at an online high school'* in British Journal of Educational Technology, Vol. 45, No 5, 2014.

[2] Martin, F. & Parker, M. *'Use of Synchronous Virtual Classrooms: Why, Who and How?'* in MERLOT Journal of Online Learning and Teaching, Vol. 10, No. 2, June 2014.

The use of a high-quality, reliable and simple workflow (Google Classroom) actually proved better than the face-to-face equivalent in the teacher's view, offering much better notifications, tracking of tasks, follow-through by pupils and a way of organising work. The separation of Google Classroom from the course structure itself was not a problem, as links could be embedded and the result was that the homework/ assessment function was 'cleaner' and not lost within the other content.

The Google Drive structure for the course provided students with logically organised access to the teaching materials for later reference to inform independent work (e.g. during the half-term observation task). The administration of this by the teacher was minimal and the assigning of rights (view rather than edit, etc) was helpful and easily done. Students placed a high value on this tool, with all of them agreeing/ strongly agreeing with the statement 'Being able to do the preparation/ follow-up tasks whenever and at my own pace suits me' and 'Being able to access the lesson slides/ documents again has helped me to learn'.

The students' attendance and participation is a clear guide to show that the approach was attractive to them. They attended every week (despite it being an after-school commitment and in competition with other, less academic options), did the homework, and were constantly asking questions inside and outside of the lessons. 6 out of 8 students agreed or strongly agreed with the statement 'I would choose to do another course in this way if my school offered it'.

Admittedly there may be selection bias at work here, but even the brightest and most scientifically-minded students would be quickly turned off by a course or delivery mechanism that wasn't working well. Other case study evidence[3] suggests that the use of video promotes 'social presence' that is otherwise missing outside of a face-to-face environment. 7 out of 8 students agreed or strongly agreed with the statement 'Being able to watch lessons (or parts of them) again has helped me to learn'.

The focus of the model that was evolved has been to produce and foreground high quality content, supported by acceptable fidelity video and sound (e.g. priority given to the learning content). This initially seemed counter-intuitive, but it is access to the *teaching* rather than the *teacher* that it was important to get right. This approach has also lead to an affiliative/ participative atmosphere rather than a didactic one, as the teacher is just another small face at the bottom of the screen and the content at the top takes precedence. The research supports this approach, with fidelity of audio identified as the most important success factor for online synchronous learning[4] and benefits to student empowerment due to a culture of equity also noted[5].

Technical issues did not prove to be the major problem – infrastructural problems were quickly resolved and students became increasingly adept at trouble-shooting device themselves. What became apparent as the course developed were the usual issues with anything run in a co-curricular model - student lateness due to over-running lessons/ sports fixtures was more of a challenge than any technical considerations. 7 out of 8 students disagreed or strongly disagreed with the statement 'I have had lots of technical problems and this has held me back'.

What didn't work?

The environment's inability to offer live, ad hoc breakouts between students or between students and teacher (in duos or trios) limits collaboration to the document level (e.g. In text comments). This is possible to set up in structured exercises by creating multiple Hangouts but this needs to be planned in to an activity due to the management overhead. 6 out of 8 students agreed or strongly agreed with the statement 'I would value being able to break into smaller groups (2s or 3s) for some tasks'.

Initial infrastructural and staffing problems at one site caused problems in the first two sessions which needed intervention from Central Office to resolve.

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[3] Zhao, H, Sullivan, H & Mellenius, I., *'Participation, interaction and social presence: An exploratory study of collaboration in online peer review groups'* in British Journal of Educational Technology, Vol. 45, No 5, 2014.

[4] Martin, F. & Parker, M. *'Use of Synchronous Virtual Classrooms: Why, Who and How?'* in MERLOT Journal of Online Learning and Teaching, Vol. 10, No. 2, June 2014.

[5] Rowe, M Bozalek, V & Franz, J. *'Using Google Drive to facilitate a blended approach to authentic learning'* in British Journal of Educational Technology, Vol. 44, No 4, 2013.

Multiple audio-visual lessons were learned as the trial progressed, resulting in the evolution of a low-effort/ high-return model: a fixed PC with an adequate video card running Panopto to automatically capture the Hangout, and a teacher Chromebook running the lesson. This separation allowed the teacher to focus on the lesson not the technology. A separate webcam on a long cable, initially thought essential, did not prove that important as the course moved forward. Indeed, many of the technical challenges in the initial couple of weeks were down to the integration of cameras and efforts to capture high-quality footage of the lesson. Simplification where possible, without compromising the educational efficacy of the setup, seems logical in hindsight.

The students haven't made heavy use of the online support sessions offered, but not because they do not need or want help, just because they seem to prefer to find it elsewhere. Typically, students will access course materials, their notes and recordings of lessons, with only one or two using the online support sessions. Where they have questions, email seems to be the preferred method of contacting the teacher. Demand is predicted to pick up once revision starts and the pressure rises. Synchronous expert support may also be very different with A-level content and once participants are more separated from each other. 4 out of 8 students disagreed with the statement 'The online support sessions the teachers offer have been useful to me'.

What would you do differently next time?

- Integrate the taught sessions into the curriculum and timetable to enable students to participate fully, without additional pressure or workload. Three 60 minute sessions (or possibly one as a double) would mirror the f2f A-Level approach and be most likely to fit into schools' structures, especially if they all began at 9am;
- Augment the environment to include breakout facilities to add ability for ad hoc peer/ teacher collaboration;
- Implement a central audit and gateway list of technical minima for all participating schools, including a site visit from a Technology Specialist to assess the proposed learning environment. Local IT teams' experience of GAfE and Chromebooks is usually nil;
- Training materials are definitely needed for facilitators at the far end. An induction process needs to be defined and developed, with input from Marcomms/ training specialists. Materials should be simple yet detailed enough that the model of both teaching and facilitating can be reliably imprinted anywhere. New teachers will need detailed induction, probably drawing heavily on Rob Bastin's experience and skills;
- Headphones for pupils are a definite requirement;
- The inclusion of guest speakers, particularly from HE and related professions should be considered as the format lends itself well to this and significant value could be added, educationally and reputationally.

Evidence of impact

It is difficult to judge at this intermediate stage, prior to examination results. The teacher's judgement is that the work produced thus far has been of an appropriate/ high quality for Y10 students following a GCSE course. Pupils have coped with the level of the information, possibly aided by the fact they can re-watch lessons/ access materials whenever they need, and by the low numbers in the class. Their answers to GCSE-level/ style questions (which is new to all of them) have been of a high quality and this hasn't fazed students. The teacher has introduced micro credentials in the form of 'digital badges' to show completion of a module to standard, though this is at a very early and informal stage. Rob predicts that if the students' progress trajectory continues, they will all achieve at least a C at GCSE with many doing much better. Their coursework component is on track for this, e.g. the quality of their observation sketches is very good. 8 out of 8 students agreed or strongly agreed with the statement 'I think I am going to get a good grade in GCSE Astronomy'.

What are the challenges to scaling this model?

- Due to the diversity of schools, we may not be able to select entrants so rigorously and some students may not be as able as this pilot cohort. Selection criteria will need to be agreed with schools;
- The need to achieve 3-4 hours of taught time per week to deliver the A-Level content. This argues for a curricular rather than a co-curricular model. Each teacher could manage 2 A-level groups of 3 hours each per week, with an hour of (mixed group) online support one evening;

- Group size: Low teens (13-14) should be the maximum, to enable quality interaction. This is the opinion of Rob and mirrors the approach taken by commercial tutoring companies. In this first cohort lower pupil numbers would support the development of teachers' skills/ confidence/ new models of delivery and provide closer support to pupils;
- Facilitation: Central Office technical support may be initially needed and this will be a challenge if spread across several sites due to the synchronous lessons;
- A clear set of guidelines/ expectations around acceptable behaviours and boundaries are needed to which students would sign up. Parental approval may also be required;
- Recruitment of suitable lead teachers is probably the greatest challenge. The case studies carried out elsewhere echo our findings – it is extremely challenging to manage an environment with multiple modes of communication, with far less feedback than is typical in f2f, and yet still give every learner equal attention. Teachers who have been extremely effective in other environments may struggle in this one[6].

Dominic Norrish, December 2014

[6] Cornelius, S *'Facilitating in a demanding environment: Experiences of teaching in virtual classrooms using web conferencing'* in British Journal of Educational Technology, Vol. 45, No 2, 2014.