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Maintaining Innovation Between Projects

A reflection on the journey to the Wales Virtual Hospital

This chapter presents a reflection on the key factors that enabled a small Digital Education Team to maintain innovative practice across several small immersive learning projects, leading to a much larger project with significant impact. These factors revolve around relationship building, team culture, working with students, and dissemination that encourages further engagement. These are presented within the context of the Digital Education Team's approach which focuses on empowering staff to do things for themselves and considers issues such as deployment of innovative practices at scale and across disciplines.

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Introduction

During the experimental phase, innovations in digital education can take the form of specific, small-scale projects with a fixed timescale and fixed budget. While this may be appropriate as the outcomes are unknown, it creates challenges for the implementation, sustainability, and scalability of successful innovation projects.

This chapter reflects on the key factors that allowed a small team from within the Cardiff University Learning and Teaching Academy's Digital Education Team to maintain innovative practices between several small-scale projects investigating immersive learning which led to the development of the Wales Virtual Hospital (WVH), an immersive teaching platform for all universities and National Health Service (NHS) Health Boards in Wales.

After briefly outlining some of the work undertaken from 2015 to 2022, this chapter presents the team's reflections on the factors that made their work successful:

- Relationship building, leading to authentic collaborative working between digital education staff, academic staff, and external partners.
- Time and appropriate financial support being available to support the early stages of innovative practice.
- Genuine recognition of experimentation as a valuable use of time.
- Constructive and supportive dialogue with peers in a safe space.
- Dissemination with a focus on how staff can take their first steps into these areas.
- Connecting with other central teams and processes.
- Working with students on innovation projects.

Context

The Cardiff University Learning and Teaching Academy
There are several teams and sub-teams mentioned in this chapter. This short explanation provides clarity, context, and the acronyms used.

The Learning and Teaching Academy (LTA) at Cardiff University is a team within Academic and Student Support Services and occupies a central role in the University, working with all academic disciplines rather than being attached to one specifically. The LTA has held different names in the past and the name was changed during the time period discussed in this chapter. However, for clarity, this team will be referred to as the LTA throughout.

The LTA is made up of sub-strands working in areas including Digital Education, Education Development, and Student Engagement, as is relatively typical for these sorts of teams (Kottmann et al. 2016), and also in Welsh language provision

as Cardiff is a bilingual university. Most of the activities described in this chapter were undertaken by specific people in the Digital Education Team (DigEd Team), a sub-strand of the LTA. These specific people will be referred to as the Wales Virtual Hospital Team (WVH Team) throughout this chapter to distinguish them from the other members of the DigEd Team, which will be necessary for clarity.

Immersive learning
Immersive learning will be used as a term to cover learning activities that involve digital simulations, immersive media (360-degree images and video), virtual reality (VR), mixed reality, and other similar concepts such as desktop VR and immersive projection rooms.

The Journey

This section outlines some of the work that the WVH Team undertook during their investigations into immersive learning. The stages of the journey can be considered as broad descriptive categories of how the WVH Team felt about the work they were doing, rather than aligning specifically with one of the many models available that describe how innovations take place. These stages will be described as:

- Exploration
- Focusing and Prototyping
- Virtual Hospital Project

Exploration
The exploration stage was about determining what was currently happening in immersive learning, what was technically possible, and what was on the horizon, with a focus on how it might be used to enhance teaching and learning.

Exploration of the current capabilities of immersive technologies began in late 2015 and was informed by the interests of the WVH Team, who had briefly explored this area shortly before joining the LTA.

At this time, the 'second wave of VR' (Anthes et al. 2016) was in its infancy with several consumer level products that were not much more than minimum viable products, relying on novelty value and enthusiasts to look past the shortcomings. Products such as Google Cardboard (launched 2014), and Samsung Gear VR (launched 2015) are good examples of what was available at this time, shortly followed by a myriad of similar plastic headsets using a mobile phone as the screen.

Content for these devices was — and still is — generally split between real life capture using 360-degree cameras, and 3D generated content using platforms such as Unity and Unreal Engine. 360-degree cameras at a consumer level were generally made up of two fisheye style lenses positioned on opposite sides of the camera, or more DIY setups utilising

several action cameras attached to a tripod-mounted rig in such a way that their lenses covered the entire 360-degree field of view.

In 2015, the LTA awarded a small amount of funding to the School of Dentistry for a project titled 'Enhancing assessment and feedback quality through the use of multimedia technology'. During this project, students were responsible for creating video content involving exemplary and non-exemplary practices that could be used as preparation for assessments and discussion points in reflective practice.

Towards the end of this project, the WVH Team created a short video using a 360-degree camera made up of two fisheye lenses to capture exemplary practice of someone cleaning a dental clinic between patients. A 360-degree perspective was chosen in an attempt to capture the entire process from a fixed observation point, rather than from a camera that moved around as the cleaning progressed. This was the WVH Team's first use of a 360-degree camera playing the role of an observer in a simulation.

A 360-degree photo of a dental clinical treatment room was also taken during this session to see if hotspots could be added to the image to add basic interactivity using existing, free, or open-source software. As this was such an early stage of exploration, there was no option to look at buying commercial software for this purpose until the educational value was clear.

While capturing the 360-degree media was relatively straightforward, determining how best to deliver the video and image content so that students could use it was more difficult. 360-degree editing and production tools were still in their early stages and were somewhat inconsistent. Even tools from the major companies, such as Adobe and YouTube, existed as plug-ins or add-ons rather than fully integrated tools.

Another example of an exploratory project that the WVH Team undertook was to create a 360-degree video of the Welsh Varsity (a multi-sports competition between Cardiff University and Swansea University). This was created in partnership with the Cardiff University Student Union.

The quality of the video footage that the WVH Team were able to produce at this point was considered 'OK'; however, it was not as high quality as other consumer-level 360-degree video being produced and shared on platforms such as YouTube. As this video was going to be a promotional video, the WVH Team decided to try increasing the quality of the video by using the multi-camera method described earlier.

The WVH Team procured a tripod rig that would allow six GoPro action cameras to be attached and borrowed six cameras from several other teams across the University. Following some initial tests, it became clear that, although this would increase the quality of the video, it would also add significant complexity to the entire process as there were six times as much video footage to transfer and store, six batteries that could run out of charge, six wireless connections that had to stay in sync, and six cameras producing heat that was absorbed by the mount with nowhere for it to dissipate to.

Once the virtual varsity project had been completed, the WVH Team reflected on improvements needed in both their technical workflows and in the content production, particularly identifying a need to develop further understanding of the value of 360-degree content, and how to embed interactivity to enable active learning (Lee, Wong & Fung 2010).

By this time, it was clear that immersive learning was going to be a growth area. Although the WVH Team were aware that publication bias was important to consider, studies were showing positive educational outcomes (Christou 2010) and also suggested that immersive learning might help to address some of the challenges that the WVH Team were hearing about from teaching staff, such as the need to improve interprofessional education in healthcare disciplines (Bovill et al. 2016). However, much of the specific research on the use of immersive learning in education, particularly research relevant to the specific learning activities the WVH Team felt were more useful for Cardiff, involved quite small numbers of participants, used very specific experiences, or involved quite a lot of facilitation to make sure everything ran smoothly. Whilst these studies gave the WVH Team some confidence that they were going in the right direction, it was difficult to find specific examples in the research that matched the DigEd Team's approach to enhancing learning and teaching.

In brief, the DigEd Team's approach has always been to empower staff to do things for themselves, working in partnership to ensure that staff had the skills, platforms, and support to appropriately embed digital education practices into teaching, learning, and assessment. As a central team tasked with working across the University, it was also important to ensure that new platforms and tools would be relevant to a range of disciplines where possible. This approach gave the WVH Team some general direction during the exploration stage, meaning that, if it became clear that a piece of software or surrounding process would not align with this approach, then it was something to monitor, rather than actively pursue.

Focusing and prototyping

Many similar small pieces of work were undertaken during the exploration stage, and by summer 2018 the WVH Team felt that they had a decent overview of what was happening in the education and technology sectors regarding immersive learning, understood what was generally possible, and knew the next steps required to focus these explorations into something tangible and aligned with the DigEd Team's approach.

The WVH Team identified four areas that they needed to focus on, to move closer to that goal:

- Developing a solid understanding within the team about the value of immersive technologies so that they could confidently discuss this with staff.
- Developing a robust technical production workflow for the creation of immersive content.
- Determining the most appropriate delivery platform for immersive content, considering interactivity, accessibility, sustainability, and scalability.
- Developing the end-to-end process for developing immersive content, including expectations surrounding the roles of teaching and support staff within that process.

During the focusing and prototyping stage, the WVH Team completed more small pieces of work related to immersive learning and used them to help further develop in these four areas.

The WVH team next developed several prototypes that fitted in with the DigEd Team's approach and could be shown to staff to inspire them, using these as examples of what staff could achieve—and more easily than they might have expected. One of these prototypes was a virtual Objective Structured Clinical Examination (OSCE) designed to prepare students for the sorts of questions they would be asked in their real examination, but also to familiarise them with the room that they would be in and the processes they would have to follow. This used a combination of 360-degree images and interactive learning objects. Another prototype used a mix of 360-degree video and 360-degree images to create an immersive scenario where a patient had collapsed in a waiting room, designed to let students practise and demonstrate their decision-making skills utilising gamification concepts and data tracking as they moved through the scenario.

The Wales Virtual Hospital project

Most of the small projects undertaken by the WVH Team could be described as more of a closed innovation (Almirall & Casadesus-Masanell 2010), with only a handful having a minor external component. However, in January 2020 a member of staff from the School Of Medicine approached the WVH Team about applying for some funding to take the concept of the virtual OSCE and patient collapse scenario and turn them into a proper product that would be scalable across clinical disciplines at Cardiff and potentially elsewhere.

In October 2020, the Wales Virtual Hospital project was funded by Accelerate Wales with representatives from most Welsh universities and Welsh NHS Health Boards as partners. The goal was to create a platform that could be used across Wales that would allow educators to themselves create good quality digital immersive simulations, using 360-degree photos and videos, rather than relying on third parties and incurring

the associated costs. By creating a cross-Wales platform, the WVH Team hoped that it would encourage adoption and engagement, as staff who moved between universities and NHS Health Boards would be able to use the same platform and collaborate across institutions.

There were a few immersive learning platforms available at this time. However, the project team felt that buying an off-the-shelf product would mean that staff would be designing activities within the affordances of the platform (Maloney & Freeman 2020); it would be better instead to design the platform around the activities, especially as the potential uses of simulation are extremely varied (Gaba 2004). The platform was developed by local VR company Virtus Tech and version 1.0 was completed at the end of the project in November 2022. This has started to be used in several Welsh universities and is being centrally evaluated by NHS Wales. Further development of the platform is continuing based on user feedback and the platform is being commercialised (as the Virtual Hospital) outside Wales, which was an expectation of the Accelerate Wales funding. Feedback on the platform has been positive from staff and students; a formal evaluation of activities involving around 200 students is due to be published in Autumn 2023.

Key Success Factors

This section will outline and reflect on the key factors that enabled the WVH Team to continuously improve their practice in this area, even when there was not a specific project or a piece of work being delivered. The overall result of this continuous improvement approach was that, when the idea of a Wales Virtual Hospital was brought to a member of the WVH Team, they could advise on the current practices and technologies surrounding immersive learning and make valuable contributions to shape the project from the outset.

A reflection-based activity was undertaken by the two core members of the WVH team in September 2022. This activity was an unstructured discussion with the aim of identifying factors that contributed to their success, which could then be shared with the rest of the DigEd Team to shape how innovation occurred in the future.

The points raised in this discussion were grouped into seven key factors that the WVH Team felt contributed to their success; these were ratified by three experienced members of the DigEd Team who had been undertaking innovative practice in other areas.

1. Relationship building, leading to authentic collaborative working between digital education staff, academic staff, and external partners

The WVH Team had been invited to be involved in many of the projects listed earlier due to the relationships that they — as part of the DigEd Team — had developed over time by working closely with the teaching staff involved.

These relationships were developed through working with teaching staff on other projects, undertaking smaller pieces of day-to-day work, providing general digital education support, and through discussions at events.

By working in this way over several years, the DigEd Team had established themselves as a team to go to for their knowledge and skills, but importantly also as a team that were friendly, happy to help, and able to get things done.

These relationships meant not only that the WVH Team were invited to be involved in these projects, but also that once involved they could work in partnership with other participants as collaborators who understood the context. Their perspectives, ideas, knowledge, and skills were recognised, trusted, and valued because of these existing relationships.

When it came to external partners, being experienced in relationship building meant that they could quickly build relationships and influence partners effectively, with their feedback being taken on board in a constructive manner.

It was clear from the reflective activity that the WVH Team felt that, had these relationships not developed from working on other pieces of work and being generally helpful and friendly, the opportunity to be part of most of these innovative projects would never have existed.

This factor was considered highly important by the WVH Team and the other DigEd Team members who ratified the factors, and the value of relationships and trust when it comes to innovative practice has been documented (McGrath & Krackhardt 2003; Moolenaar & Sleegers 2010).

2. Time and appropriate financial support being available to support the early stages of innovative practice

In factor one, relationships were key to the WVH Team being offered the opportunity to be involved in innovative projects. Factor two is about ensuring that these offers could be accepted.

Although horizon scanning and supporting innovative practice was a part of the DigEd Team's remit, in reality there was a lot of other work competing for their time, much of which was

more urgent, had a tangible impact, or was more visible to key University stakeholders. Being empowered to set aside short and specific periods of time for explorative work was seen as extremely valuable by the WVH Team during reflections. Being able to dip in and out of explorations as other workload naturally fluctuated was also important, with the WVH Team reflecting that ensuring each member of the team had enough understanding to continue exploring even when others were unavailable meant that the momentum of the exploration could continue. This did not mean that each member needed to be an expert in all aspects of the work, just that they needed to have enough understanding to push things forward whilst highlighting gaps to be later looked at by people with other specialties.

In terms of financial support, the LTA had no budget set aside for ad hoc innovation tasks, so the only way to request any money to support innovation-related activities was through the same channel as any other request for money such as travel expenses and IT equipment. The six-way camera mount mentioned earlier only cost £50 but was difficult to justify through this standard channel, as the reasons for purchase were less tangible than traditional requests. This situation also made it difficult to accurately estimate how much money to request when external funding became an option, as the WVH Team had been used to making do with what they had access to, borrowing equipment, and sometimes using their own computers to edit and render 360-degree content when this required more computing power than they had access to.

In contrast, during the pandemic a fund was created to cover digital education activities that fell outside standard provision and needed some financial support during the transition to remote learning. This was a well-managed fund that could respond rapidly and appropriately to requests as they occurred. During their reflections, the WVH Team felt that this sort of model of a low-value, well-managed fund, available internally, would have been ideal to support exploratory activities.

Innovative practice is something that does require time (Serdyukov 2017) and this factor was again quickly ratified by the other members of the DigEd Team.

3. Genuine recognition of experimentation as a valuable use of time

As mentioned in factor two, a small part of the DigEd team's work is around horizon scanning and innovative practice. However, factor three specifically involves the perspective of others in the DigEd Team who were not members of the WVH Team and were, at the time, working on different projects that were more tangible and deliverable rather than exploratory.

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Being in a small office, the work of each member of the DigEd Team (and thus the WVH Team) was extremely visible to colleagues, managers, and senior management. The exploratory between-project work occurred mostly in or around the office and was also routinely mentioned in updates at weekly stand-up meetings, general team meetings, and in one-to-one discussions with line managers.

Innovation can be time consuming (Serdyukov 2017) and it would have been easy for these colleagues to question the value of this work, especially when they were also extremely busy. However, there was an informal understanding within the DigEd Team that, as long as the core work was being done, there would always be time for people to explore areas in which they were particularly interested, including the following exploratory interests from the DigEd Team at the time: micro-credentials and unbundling; Massive Open Online Courses; digital capabilities; communities of practice; and student digital champions.

The WVH Team reflected that, not only was this collegial understanding conducive to being able to continue exploring between projects, but it also created a culture where people supported and genuinely enjoyed hearing about their work, and where the WVH Team could take a similar interest in the innovative practice of others in the DigEd Team.

4. Constructive and supportive dialogue with peers in a safe space

In factor three, recognising the value of the WVH team's work meant that they felt supported and empowered to continue experimentation between specific projects. Factor four reflects how the DigEd Team were also happy to take this support further by being involved in discussions with the WVH Team to provide valuable external perspectives, feedback, idea generation, testing, and other support.

The DigEd Team considers one of its strengths to be the diverse range of experiences and interests across the team, alongside the trust, understanding, and respect that exists between its members. The WVH Team reflected that they could share their work and receive feedback in an environment that felt constructive and where everyone involved wanted them to succeed, whilst also wanting to make sure that they succeeded in a way that fitted with the DigEd Team's approach.

Both factors three and four involve people trusting each other enough to show some vulnerability in terms of their ideas. This resonates with discussions of trust being important for innovation in organisations (Dovey 2009).

5. Dissemination with a focus on how staff can take their first steps into these areas

Factor four helped to ensure that the work undertaken around immersive learning was done well; factor five relates to ensuring that staff around the University could then engage with the team and make use of that work.

The WVH team felt that, when immersive learning projects were presented at events, they regularly lacked a 'and this is how you can do something similar' component of the presentation. They reflected that this was sometimes because innovation funding had been necessary to achieve the project outcomes, making it out of reach for people with no access to similar funding, or because, once the innovative side of things was complete, there was no funding to roll out more widely.

Dissemination is key to adoption (McKenzie & Alexander 2006), so the WVH team and other members of the DigEd Team decided to actively change how they disseminated their work, ensuring that there was always a clear way for other staff to get involved. The WVH team started using the phrase 'Show (off) and tell' as a concept for how to avoid presenting their work. This was particularly relevant at internal events, as the goal was to enable Cardiff University staff to see what was achievable and how to get involved; it has also been a successful approach at external events.

Coupled with the DigEd Team's approach, particularly around the long-term support and scalability, the WVH Team felt that presenting their work in this way helped to address the criticisms that the LTA had previously received: that their innovation projects often focus on the same audience of innovators, early adopters, or previously engaged staff.

6. Connecting with other central teams and processes

As part of a central University team, the DigEd Team works closely with other central services, such as IT, procurement, and compliance. The WVH Team reflected that being aware of the processes that involved these teams, and knowing who the key contacts were, meant that they could get the right people involved in projects when required. This awareness meant that there were fewer unexpected issues arising during implementation and that the WVH Team were able to draw on the experience of these teams to help guide the direction of their work. The WVH Team reflected that they had seen innovation projects of different types and sizes struggle to get integrated because these central teams had not been consulted at all during the development.

In both factors five and six the WVH Team were able to act as orchestrators (Furr and Shipilov 2018), encouraging staff to work directly with each other. The WVH Team also felt that the change to dissemination in factor five and the fact

that they work closely with other teams in factor six helped to avoid innovations failing between the early stages and wider implementation, which can commonly occur (Edler & Fagerberg 2017).

7. Working with students on innovation projects

Finally, several of the projects involving the WVH Team included students, either as co-creators or taking the lead more formally as part of their studies. As well as adding value for the students themselves (Bovill et al. 2016), the WVH Team reflected that working with students had been useful as students often suggested ideas that the WVH Team would not have considered.

Students were also generally happy to give honest feedback and provide a perspective about immersive learning within the wider context of being a student studying multiple modules with different activities in each one. When planning and developing learning activities for students in lower years, students could reflect on what would have been useful for them, with the advantage of also knowing what would actually be expected of them based on what they learned during that activity. Much of this discussion in clinical disciplines related to preparing for going into practice.

When students took the lead on projects, the WVH Team reflected that the students often had more time and different priorities to teaching staff, so they could be more engaged in the projects that they were doing.

Overall Reflections

Apart from factor two (time and financial support), all the key factors are about people. Whether it was relationship building with teaching staff and central teams, constructive dialogue within the DigEd Team, or changing the focus of dissemination, people are at the heart of each of these factors. This came as a surprise to the WVH Team, who had initially expected the factors to have more of a technical nature.

The WVH Team felt that building and maintaining relationships across the University (factor one) was critical to the success of their work, as it was these relationships with teaching staff that allowed them to be invited to be part of innovation projects in the first place. Without this, the other factors would not have mattered. They also felt that it was very hard to evidence the value or impact of building and managing these relationships, despite knowing that it was clearly a valuable use of time.

Linked to this was that the WVH Team felt like they were empowered to say 'Yes' when these invitations came to them. This was partly because their remit involved some horizon scanning, but mostly because of the attitudes of

their colleagues around the value of this sort of work and the support they could provide. Although not every idea turned into something, the WVH Team felt that being approachable and positive during initial discussions about their ideas made staff feel that they could come back to them with their next idea — which might.

Finally, the DigEd Team's approach is interwoven into several of these factors and the WVH Team felt that this approach has been crucial to their success, by providing a focus during the exploration stage. The WVH Team felt that the culture of understanding, trust, and respect amongst colleagues that has been actively developed in the DigEd Team over several years also contributed to this success and that the value of the DigEd Team's support cannot be overstated. They also felt that this did not always exist in other areas of the University, and they were extremely grateful to be part of such a team.

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