RedFame

Journal of Education and Training Studies
Vol. 8, No. 9; September 2020
ISSN 2324-805X E-ISSN 2324-8068
Published by Redfame Publishing
URL: http://jets.redfame.com

Undergraduate Accounts of the Impact of Lockdown on Their Self-Managed Reflective Development of Graduate Abilities

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Received: July 6, 2020 Accepted: August 4, 2020 Online Published: August 10, 2020

doi:10.11114/jets.v8i9.4970 URL: https://doi.org/10.11114/jets.v8i9.4970

Abstract

This account is mostly written by students in the first year of their discipline-based study of civil engineering. It features their self-managed development of graduate abilities in the second semester of an undergraduate Irish course in problem-based civil engineering. The principal abilities were creativity, problem-solving, presentations and teamwork. The case-study paper concentrates upon four students' reports and reflections on their experiences concerning their second (partially locked-down) semester. Their accounts complement the review of the early weeks of their first semester experience, that has already been published elsewhere. They are joined by the tutor who was an external facilitator of their early drafts of reviews. He suggested the compilation and structure of this paper, and has assisted with the assembly of the condensed individual contributions.

Keywords: graduate abilities, self-managed, reflective development, lockdown

1. Background

The degree program for the four student writers began in 2018-9 as Common Entry Engineering. They completed this year together with approximately 200 other students. The aim of this programme was to ensure that all students had the same basic skills, and some knowledge of the different engineering degree choices on offer - Mechanical, Biomedical, Design and Manufacturing, and Civil.

Thus those who chose Civil Engineering really only began their specialised programme in the following September. They soon found, as one described, that "Civil Engineering lecturers are a tight-knit bunch who really pushed for us to develop skills beyond the kind you could learn from a textbook." There was a heavy emphasis on public speaking, teamwork, communication, creativity and independent problem solving (Quilligan, Phillips, & Cosgrove, 2017) . This came as a shock to most students in that autumn semester.

Most of the imaginative and varied course tasks were completely open-ended. Inputs from the lecturers were rare, other than to introduce tasks and provide some initial facilitation of group working in activities such as brainstorming. The students' learning was facilitated, not taught. In what they later learned was an initial reflection-for-action (Cowan, 2017), they were asked to identify what they saw as the imminent course demands, and how they might each engage with them. After seven weeks they were expected to compile and submit an evidence-based account of their individual progress while engaging with these demands.

Students were told that a Scottish academic had offered to read draft reports confidentially, and suggest how these could be improved. Many took up this offer. They later learned that he had been impressed by what he had read, and had compiled a composite account of the class experience, using unedited first-hand excerpts from twelve individual claims. He asked and readily received these writers' permission to submit this to the journal *Reflective Practice* (Cowan, 2020). The submission was prefaced by his summary of the pedagogical framework of linked reflections which underlay the student activity. The paper was published speedily.

When the class of 2019-20 progressed into their second semester, four of the original writers were contacted by this tutor. He had been invited by the editor of the present journal to follow up the account in *Reflective Practice*. He felt that, once again, an account of the experience of engaging in further self-managed development of abilities should be written mainly by students in their own words. His email explained that he was approaching a quartet whose detailed and enthusiastic writings had contributed strongly to the account of that first semester of Civil Engineering. He asked them to join him in

the present paper; all readily agreed. He suggested headings which they might address, and offered to conflate these writings as before.

2. Completing the Already-Published Account of Ability Development in Semester 1 (Clarissa Harte).

There are only so many skills with whose development our lecturers can aid us. As learners on this programme, the onus is on us to enhance our abilities where we see fit, and to take full responsibility to develop others. In Semester 1, we were gifted a creative opportunity for us to develop thinking skills, researching skills, presentation skills, problem solving skills and teamwork. This safe space was presented to us as a module called 'Design Studio 1'. (Cowan, 2020).

In this first semester, we undertook a project where we designed and constructed a 6-metre wooden structure to allow the safe passage of Declan Phillips across a campus pond. Here was our first experience of seeing how our calculations made up of mathematical equations came to life. We had the opportunity to see how what we learn in class relates to real-life structures that we create, and to see a project through until the end. I understand we are the only college in Ireland that creates these structures on this relatively large scale.

In Semester 1, our class also had 'Building Materials Assembly and Structure' with Tom Cosgrove. He espoused the virtues of the engineer who could draw with ease and communicate effectively through drawings. With Tom, we drew - on site and in class. Inspired by his enthusiasm, I decided to further develop my sketching skills and draw regularly, and continue to do so.

Finally, during Week 10, Declan Phillips organized an hour on Mindfulness. The guest speaker spoke of being in touch with yourself, and taught us what mindfulness meant. I thought the timing obscure as we had exams coming up and we wanted to be studying! Nevertheless I soon realized that thinking that I did not have time for the mindfulness meant that we did indeed need it and would benefit from it. The following week we had our final presentations for Design Studio 1. They were held in a conference room in Limerick City. This gave them more importance; and having them in a location other than our classroom heightened my anxiety. Beforehand, we had an hour of mindfulness; this calmed me and allowed my mind to rest before the pending presentation. Nevertheless, I could not refrain from rehearsing my presentation in my mind.

If I had been told at the beginning of the module: "Clarissa, at the end of this module you will stand up alone in front of your class and deliver a six-minute presentation about 'Women in STEM', I would have sat there feeling dubious. Nevertheless, I was able to do it. Re-watching the video of my first presentation on this course, and comparing it to the video of this final presentation, I believe I saw ample evidence that my presentation skills had improved. In my final presentation I did not read from notes, and I engaged effectively with the audience.

3. Semester 2 Continued at First as a Natural Progression – Then Came Lockdown! (Ellen Doorly)

3.1 Independent Learning

I believe being able to learn independently is a fantastic opportunity and skill to have. Some days when I'm tired, if there's a big project due or if I'm sitting at home finishing work while my friends go out, I curse my lecturers. Why can't they just hand us some notes and be done! What is it with their love for group work, and the lack of an assigned textbook? But I know the answer; I've known the answer since day one. It's to encourage us students to learn independently. Independent learning is a very broad term which considers many different skills: communication, teamwork, problem solving, time management, organisation, analytical skills and motivation. In my reflection last Autumn, I thought about some of the skills needed to achieve independent learning, which I was not comfortable with then. Mostly motivation to get started, as I was second guessing all my ideas; and time management.

We often only learn about the most amazing discoveries in Engineering. As a young person I look up to these, thinking that someday I'm going to achieve that and better. I wanted to do the most interesting project in my course. I picked ideas I didn't have the skills to achieve, and was stressed when I couldn't achieve them. The starting point is not designing fantastic creative buildings or fixing a problem which has been around unsolved for centuries. It's learning basic skills to the finest degree so that when I need them in the future I have a running start at every project I undertake. It's like learning how to use a chainsaw so that. when the time comes, I'm not trying to cut down a tree with a butter knife.

With this in mind I attacked the spring semester optimistically. We undertook a project to design a roof for a P-E hall; for this we would use skills learned in our modules on Structural Analysis, and Steel & Timber Design. Initially my team and I designed an interesting 3D structure. However, given more realistic expectations, we scaled this back to a similar shape in 2D. We had completed the first half of the project when Covid-19 struck, and we were required to complete the remainder of our college year from home.

I'd like to say that I had developed enough to be able to keep myself motivated and work consistently from home, but this was not the case. I struggled and so I anticipate a very bad grade in this module. While there was contact with our

group through video calls and a group chat, it wasn't the same. Without the same level of support and guidance from my peers, I fell behind. Being physically isolated, I didn't realise how far behind I had fallen, and so this downward spiral continued.

I have a lot more to work do before I am able to learn independently. As it stands, it looks as though remote learning will continue through to next year. Therefore, the time has come for me to set some goals so that next semester does not end as this last one did. I will try again to give a set time every day to studying - and stick to it. Having moved home to complete the spring semester, finding this routine was difficult. Having talked to a friend who has had similar issues, I think a sort of buddy system would work - to motivate each other to do more work, and to scold each other if work is not completed.

3.2 Learning How to Adjust Quickly.

Adjust – *verb, to alter or move something slightly in order to achieve the desired fit, appearance or result*. If I had to pick any word to sum up the last six months, it's this one. Like any college semester, it began with settling into a new set of modules. I was excited and busy: keeping on top of work, setting goals, and planning for the summer ahead. I wish I had known then what I know now, but this in itself is the essence of a reflection. What would I have done differently, what would I keep the same and how I will apply these thoughts to my future.

I've always been set in my ways. Once I decide on a plan, I like to stick to it, as I have a certain comfort in knowing that I've decided on my path. In contrast, this year I've had to learn how to adjust, to change my plans, expectations and mind set. I've known all along that Civil Engineering can be very changeable. Unexpected things happen all the time. Sometimes this is due to an oversight by the engineer. At other times, this is not anyone's fault; for example, if you're working on site then a site investigation may reveal some new information which wasn't anticipated in the original plans, and for which accommodation has to be made.

Typically, in college we aren't really exposed to that changeability. We are guided by our lecturers who have a wealth of experience and knowledge. At the beginning of each module we receive a module outline which is used to guide our learning for the 12-week semester. It is there to show us clearly what our lecturers hope we will have learned by the end of the module and what assignments we will have to complete. In the autumn, while the work which was outlined for our modules was difficult, it never changed. For example, when we were given the module outline for Structural Engineering and Design 2, it stated that our task for the module was to design a structure which would allow a person to cross the pond in the middle of the campus.

Midway through this semester, that all changed. Lockdown began. Module outlines changed radically. The amount of material changed. Our level of interaction with our peers and lecturers changed. The assessment changed. All for good reason, but it was a shock to the system no less. Circumstances have required us to adapt – radically. I think the ability to adapt is a key skill to have, and this experience will certainly equip us as we go out into the workplace. We will be more flexible and ready to adapt because we've done it this semester.

Despite having written that, I know I'd rather not do it again!

3.3 Academic Challenges

This term we undertook five modules which each presented their own unique challenges. Some followed on from things we had learned in First Year or the autumn semester, while others were completely new. One of our new modules was Introduction to Geology and Soil Mechanics. I really clicked with this module and look forward to studying this subject more in the future. Our learning here was based around five core sections: effective stress, seepage, compaction, site investigation and earthworks. Through these five topics I got to see how versatile a material soil is, and how it can be used in civil engineering. We completed a project where we had to design a dam which could protect a student accommodation village from flooding. Local Thomond village is at risk of flooding each and every year. This idea to build a protective earthen dam there had been proposed by senior engineers' years earlier, but never came to fruition. Our challenge was to design a working dam and fix this issue. This is the sort of real-life challenge that our degree program is based on.

While our programme is very challenging to work through, I am growing my confidence in my engineering skills with each problem we face and complete.

3.4 Closing Thought

It would be an understatement to say that Covid-19 was a bump in this year's education journey. We have lived through it, and I'd like to say I've learned from it. Now I and all the other students who worked though this will have an experience that other generations won't, and maybe that will be an advantage in the long run.

4. Detailed Aspects of This Semester (Damien Madigan)

4.1 Demanding Modules

I struggled with some aspects of Structural Analysis, and almost all of Steel Design. For most of the semester, I found myself clutching at straws to keep up with the group work. As exams approached at the end of the semester, I began to understand many of the concepts; once they clicked with me, I felt stupid that I did not get them earlier.

In Steel & Timber Design, I was quite lost from early on. I never missed a lecture, but understanding escaped me no matter how hard I tried. My main problems were not being able to visualize the forces acting on each member, and understanding how to work out factors of safety. I spent four hours reading through different Eurocode documents and our lecturer's notes, just trying to figure out how to design a member in axial tension. Eventually a member of my group pointed out where I should have found it earlier in the lecture notes. Once I got that, everything else became a little easier. Both of these modules were very challenging but the only way to get through it was to sit down, try to work my way through, and to study.

4.2 Working in Lockdown

The main challenge this semester was dealing with study and college work at home. It took me about two weeks before I began to get into a good enough routine. A major result of lockdown was the changes in assessment. Without a sit-down exam, our lecturers needed to maintain the integrity of the course but to still test us fairly. Some decided to give open-book continuous assessment style tests every fortnight, which allowed us to prepare for specific topics. This made it easier to prepare and to refresh and learn for the final online exam.

Fluids and Energy addressed assessment differently. Rather than a final exam, we had a project, an educational video to prepare, and a module reflection/peer assessment. For our project, we were assigned into groups that were each allowed to choose the three topics we would investigate and deliver a 'final year project' style report on. The topics we chose were: the fluid flow phenomena of the drag of an f1 racing car; designing cooling tanks in a milking parlour to cool milk quicker before storage; and the effect of the internal surface of long distance oil pipes on transportation of oil lubricants.

The basis of this module was the Buckingham pi theorem, and using dimensional analysis in our study. After a week or two of study, and emailing the lecturer for advice, I concluded that our crude oil transfer topic was too simple for this project. So we decided to study a pump system for a well 20m deep, delivering water to three troughs on a farm. After much research, I found that Bernoulli's equation would become my best friend. After combining major and minor losses to estimate the filling time for the three troughs, I was also to find that the minor losses would not be so minor.

At the beginning of this module, my understanding of fluid mechanics was such that I knew enough to pass an exam, but not enough to use what I was learning. By the end of the module, as a result of 'self-teaching' a number of useful topics and using Excel effectively to advantage in creating equations for time intervals and illustrating graphs, I was almost enjoying fluid mechanics. Being left to my own devices by the course structure and the pandemic had obliged me to learn for myself; and, as challenging as it was, I did learn.

I needed to use the three skills featured in my autumn reflection: presenting, creative thinking and effective teamwork. For our educational video, we had to think outside of the box, and explain the Buckingham pi theorem and its applications to first year engineers. Our video should be interesting, captivating, appropriate for the target audience and professional. We used Microsoft PowerPoint with its built-in presentation mode, speaking over slides and exporting the sound recordings to a video with the appropriate slides. One member of the group was good with video editing, and compiled the different videos into one, added background music and animations and created a well-thought-out professional video. This was an ideal opportunity for testing and development of my ability to present, with a chance for this skill to grow and become more useful for my career.

The skill of creative thinking proved the most difficult to improve. Previously I observed that forcing it to happen can often feel like trying to squeeze water out of a turnip. In order to continue the development of this skill, I resolved that I would try to get more sleep and read more, to help expand my ability to find solutions where I didn't know I had problems. In an ideal world these may have been excellent solutions. But as a keen athlete, I simply couldn't spare time to sleep more, and I didn't get around to reading much either. Nevertheless, I still feel that my ability to think abstractly is continuing to improve through consciously keeping an open mind to new challenges.

The main challenge since last semester has been Covid-19. This is very different to the challenges in our academic programme, but still tests all our skills in keeping up our studies with practically no physical contact with the academic world. I needed to create a routine so I could study and complete coursework effectively at home. For the first few days, I did my work on the kitchen table where there was constant noise, and it wasn't an ideal place to watch and interact with online lectures. Eventually I got a desk in a quiet room with access to sockets. Before I started college and subsequently, I have struggled to study by myself at home in my room. There are too many distractions - between my phone and noises

around the house. In school, I used to go to after-school study where I had no choice but to study and do my homework. In college, I would go to the library where everyone is working. I would feel out of place taking my phone out, so seeing everybody else working encouraged me to work.

After COVID, I wasn't able to shut everything out and just go to the library; I found myself having no choice but to do what I had tried to avoid during my whole educational life - studying at home. I have as yet found no simple way to help me do it other than getting more and more dependent on coffee while working away on different assignments. I just needed to sit down, put my head down and try to avoid distractions.

Another significant problem caused by studying at home was the internet connection in a rural area where the internet is unreliable. Last minute completion had to be avoided. I needed to have my assignment completed early so that I could attempt to send it by Sulis (the UL website). If that proved impossible, I had to contact my lecturers asking permission to submit the assignment through an email. Sulis had a timeout for uploading that wasn't present for emails, but it took longer for the email to send if the file was large.

4.3 Review

In total honesty, I know that the skills I've written about will need further development. I have come a long way since the beginning of my course, but once I reach the workplace, the real learning will start. I am open to continuing development of these skills, which is going to be a requirement for completion of my education and becoming a civil engineer.

My reaction to this semester is that it was appropriately challenging. When talking to students in other courses in UL, I am often reminded that they haven't experienced the intense commitment required of us early on in our first semester, and don't have as many compulsory hours or assignments to submit as we do. But I feel that, as engineers-to-be, its necessary as part of our development to be so challenged.

4.4 Closing Thought

Studying from home during the pandemic forced me out of my comfort zone so I had to adapt my core abilities to excel in an online environment for online video presentations, group meetings for projects and online tests.

5. Continued Development of Core Abilities (Keomea O'Connor)

Much has happened since Semester 1. We have completed five new modules, some building on knowledge from the previous year and some being a completely new challenge and learning experience. It's been a very challenging academic year due to the ongoing pandemic; but this challenge has brought opportunities to develop skills in ways inappropriate to college-based activity but still calling for exercise and development of basic skills.

5.1 Presentation Skills

Completing the semester off-campus made group work and learning slightly more difficult. Being unable to meet up with our groups and lecturers, we had to develop our presentation skills greatly. We managed to develop this skill although proceeding with the course from our homes and through a different medium. This wasn't like standing in front of a group and presenting a topic. It was done instead through Big Blue Button, an online means for students to interact with lecturers and with each other. We were able to have interactions much like a video call, but we could upload presentations and notes and discuss them as a group. To learn from this experience and to achieve a good grade, we had to adapt and learn a new means of communication through this online medium.

This was very different and slightly harder than the classroom experience where you could just draw something on the whiteboard or show a passage from a book to clear up confusion between group members. No, this required much more brainstorming and planning. We had to assemble and present the exact ideas we wanted to get across to our classmates and lecturers. This required us to make up presentations on Excel sheets, and to have very clear notes prepared and scanned into our computers in order to communicate effectively.

Instead of final presentations we were required to submit video presentations, which took all the anxiety and pressure out of the presentation; for we could do everything in our own time and edit it out or re-record if we made a mistake. This was a great way to learn without the pressure of possible failure in front of your peers. Live presentation is still a very important skill to have, but it was a great relief to learn to handle a different method. This was a great skill to develop, as recently I've discovered that in the engineering profession nowadays, most of the communication is electronic.

5.2 Teamwork

Our teamwork skills were really tested this semester. I feel that parts of my teamwork experience were improved, and some were hindered. In one of the modules I was very happy with how the team worked together, and were able to communicate our ideas effectively together. We used the Big Blue Button website effectively, and all group members contributed at every meeting and always had their work prepared in a manner that allowed all the members to learn from

it. There was no fishing to see if work was done or trying to carry some of the members. We all just worked well together, and I feel I learned a lot from this experience. There were a few times when I became stuck on a certain part of the project; but thankfully during these times there was always at least one group member on hand to give me help or advice on the work I was doing. Sometimes it was even just a case of them having a quick look and pointing out something that made me realise what I did wrong or made me think of a better and more effective way to do something. This was a very positive experience. I enjoyed the teamwork because it was done correctly. No one member did all the work themselves, and we divided the different aspects of the project up evenly. We also managed to work in a way that allowed us to work effectively towards the same goal because we weren't all trying to run the show in our own manner. It was a team in every sense of the word.

But there were also other team projects this year that didn't run as smoothly. My bad experience of teamwork this semester stems from a lack of communication and drive in one of the groups. Unlike a good team, this one lacked drive and motivation; members' goals were definitely not the same; most of the members wanted to just scrape by and pass the module; while myself and a select few others actually wanted to do well in the module and wanted to achieve good grades. This made it very hard to work in the group as only a few people were doing the work. Most of the members didn't even show up most of the time, and rarely did we have full group attendance. This made it a bad working environment; I felt I was working on my own. There was little communication in this group and in the end all of us were doing our projects individually. Thankfully this negative experience was negated by my positive experience in the following project and I learned a lot from both teamwork experiences. I feel like I reflectively developed my teamworking skills when I was a member of the team that worked well together, and I learned how to become a clearer communicator through using online means with my team. This also influenced my presentation skills.

5.3 Design and Brainstorming

This is one skill I haven't developed as much as the others. I still approach every problem the same way and attack every project with the same process. There wasn't much more I learnt about this skill this semester that I didn't already know and practice from the previous semester. This might have been due the fact we didn't spend as much time in college this year as we normally would have; or it might just be that we have already received a great education on this process through having a module solely focused on this topic last semester. If that is so, I won't be able to further this skill till I meet a challenge or job that really requires me to think further outside the box and in a different manner to the thought process I've gone through for most of my college projects and assignments so far.

5.4 Closing Thought

What was most significant in developing my core abilities? During the academic year I was given many opportunities to carry out presentations, group and individual projects, I feel that the repetition of these practices was the most significant in aiding the development of my core abilities of being confident and presenting in an effective manner, gaining knowledge and creating ideas through brainstorming and finally, to be effective at working through my own initiative and as part of a team.

6. Looking Back Over Semester 2, in Personal Terms (Clarissa Harte)

On opening my laptop to read John Cowan's name on an email notification with a subject title "It's me again", the corners of my mouth turned up into a grin. I wasn't sure what to expect as I clicked on the notification. Upon reading his proposal and request for my assistance, I felt fortunate for this opportunity and for my experience to be shared.

The last six months has felt like a journey. Not only were my skills improved and developed, but new skills have been acquired. Any journey worth our while comes with bumps in the road; this journey was no different. Personal trials have been overcome and we have endured a pandemic. We have converted to online learning, and group projects have been completed over voice call.

6.1 Before Lockdown, a New Module – and a New Style of Lecture

We returned in late January well rested and prepared to re-engage our minds on this journey. Having read beforehand about our impending modules, and done some research, I found myself excited at the prospect of 'Soil Mechanics' with Declan Phillips. Having met him last semester and appreciated his methodology and beliefs on self-based learning, I was looking forward to it. Early on it was made clear that his module notes on Sulis (the University of Limerick website) were simply to be taken as a learning guide; they consisted mostly of pictures and graphs. Therefore it was necessary that we listened carefully to what he said, and made our own notes of what we wished to retain. Supportive information would be found on Sulis as educational videos and extracts from books.

I do not think Declan sees himself as a teacher but as a gateway of knowledge into this world of Soils. That means it is up to us as a class how much we learn from him, based on our interaction with him in class and with his materials. He does not teach nor lecture, but helps us to see and understand what soil mechanics is about. He does this through sharing

past experiences, anecdotes, experiments and history lessons; these bring the topic to life. I imagine delivering classes through a computer was to prove more difficult for him than interacting with us, face-to-face.

Previously I had relied so heavily on lecturers' notes – not out of laziness, but from a lack of confidence in my capability which was probably ingrained in me from being spoon-fed notes in secondary school. This module pushed me out of a comfort zone that I had sat in so comfortably, and left me with no option but to create my own notes and have confidence in their adequacy. Declan posted extracts from books, papers and his own educational videos onto Sulis, to aid in our learning. On reflection, I understand how powerful it is to have rid myself of the crutch of lecturers' notes and to have started to generate my own knowledge of the topic. I assembled my notes from the Sulis resources, and from noting important phrases and concepts from what Declan said in class.

In the autumn semester we had completed a large project in Excel. Then, in the Soil Mechanics module in Semester 2 and in the Fluids and Energy module, it was required that we again used Excel. This is a program that is very useful to civil engineers for displaying survey data, budgeting, designing, quality control and much more. Thus far we have completed a Hydrology and Water Engineering project using Excel to predict flooding events, to reroute a river and to design a spillway. As a class we struggled, not only because the project was challenging but mostly because we had not used Excel before and prior knowledge appeared to be expected of us, since other courses in our University are taught how to use Excel as part of a particular module. Having a crash course on Excel would have been invaluable for us! Instead, we had to teach ourselves. I wonder if that was a deliberate decision in the design of our course to develop our abilities?

6.2 A Learning Project for Me, Outwith the Course

Being female in a male-dominated field can on occasion be daunting. I envisaged myself entering the working world and not feeling comfortable or not having my voice heard. To build my confidence, I sought to make connections in the world of 'WiSTEM2D', which stands for Women in Science, Technology, Engineering, Maths, Manufacturing and Design. I successfully applied for a scholarship offered in Semester 2 by Johnson & Johnson. Here, I and 24 other female students from various STEM disciplines in the University of Limerick were split into five groups to complete a project in the form of a video, poster and a short presentation. The programme began in January and ran until the beginning of March occupying about two hours per week. It included workshops run by Johnson & Johnson where we developed our Interview Skills. I felt this was an invaluable skill for me to start developing at this point. We also developed our CV's, learned how to set up a LinkedIn account and the etiquette for this platform, and for presentation skills.

While on this scholarship, we researched Irish women in STEM. I was fortunate to be one of a pair to meet and interview Prof Ita Richardson, a Co-Principal Investigator in Lero (the Irish software research centre) who is also an Associate Professor in the Department of Computer Science and Information Systems at the University of Limerick. In awe of her reputation, we had emailed requesting an interview; she responded within minutes, with enthusiasm. In the interview, she was kind, enlightened, modest, strong and captivating. We also met Norah Patten, an Aeronautical Engineer who in 2018 won an Excellence Award in 'Limerick's Top 40 Under 40' and is on track to be the first Irish person in space. These were two of the many inspiring and enlightened women I was privileged enough to meet and make connections with. At the International Women's Day ceremony, we each from a group of four spoke briefly about our projects, and afterwards stood by our posters to answer questions. Our poster was based on the 'Leaky Pipeline Theory'. We thought this accurately represented what influences women to enter the STEM field, and why we can 'leak through the cracks'.

During this program not only did I meet women who have made their mark in the world of STEM, but 24 women of my age who could do the same. At our meetings we discussed what being a woman in our respective courses is like. Sharing these experiences with them, I feel I have come out more competent and stronger. Simply knowing I will not stand alone if I feel discriminated against or that I have been mistreated because of my gender, brings me solace.

6.3 Moving into Lockdown

Before we had begun to create our video project, our country entered lockdown - which was to prove a major bump on our learning journey. When students meet with new learning and teaching methods, there is usually an introductory period and a steady transition into the new method, as was our experience with 'Design Studio 1' in Semester 1. Our change from in-class to online learning in Semester 2 happened in one day. After we had switched to online learning, we were to feel as if we were sprinting a marathon, that we had an entire semester worth of projects, tests and half a semester of new material to cover in the next six weeks.

It began on a Wednesday morning. Our class had assembled for our 9 a.m. lecture when a concerned Michael Quilligan burst into the room. He addressed the room with a perturbing beckon. Silently we sat as he informed us of the overnight Covid-19 developments and what it would mean for our learning. Just like that, our in-class lectures, tutorials and workshops were finished. A rather bewildered and dazed group sauntered from the room, not fully comprehending what had happened. Amidst bouts of uncertainty and trouble, my brain overrode those feelings and it became about survival. I

scurried to the library to check out books I could take home with me. The following day, we met two lecturers for a crash course on how we would be accessing our lectures from then on. That evening we packed our bags and left for home. I vividly remember feeling as if I was in limbo and that I was running on autopilot, blindly doing what I was told - which was uncharacteristic of me.

The morning after, the class had their first live online lecture with Declan Phillips; it lasted for 73 minutes. To remain seated and concentrate for this length of time outside of the classroom environment proved more challenging than we had each initially thought. As time went on, I grew accustomed to it and to the fact that I would be spending the duration of the semester and exam season at my desk, in my bedroom, all day.

Each of our lecturers took a different approach. Declan had live online lectures where he would use a camera to video what he was writing, and uploaded lecture notes for us to view during the lecture. Every Friday morning at 9 a.m., be it in class or online, he began the class with an uplifting song from the 70's. I found this to be a real mood booster and appreciated it a lot. We frequently had tests that lasted 2-3 hours. While they were not heavily weighted, preparing for them, doing them and resting afterwards claimed a whole day. We found these tests draining. It was also required that we complete a flow net as part of a lab report, a brief module reflection and then a final exam.

When remote learning came into play, it brought with it with many trials and tribulations. We had online lectures that lasted from 50 to 70 minutes. During these classes, sound could be intermittent, my WiFi might crash (meaning I would need to log back in and miss what was happening meantime), some lectures were accidentally not recorded, and it was difficult to ask questions, although Declan willingly remained online to allow us time to ask questions. I found sitting still for so long for the online class, while being outside of the classroom environment, required much personal discipline.

Some groups struggled hugely in delegating the tasks. Our final project for this module was to produce an eight-minute educational video based on our understanding of how to construct a small earthen dam. Working as a group to record and construct this video remotely was effortful. Despite poor WiFi connections and background noise in the video clips, we completed our slightly disjointed video. Had college been functioning as previously, I feel confident that we could have produced a video of higher quality.

6.4 Taxing Demands in Lockdown

The trait of our briefs being open-ended and deliberately vague continued throughout Semester 2. Working remotely, this proved taxing in all group projects but my account that follows is of the one I found most trying.

In Semester 2 we studied 'Structural Analysis', in which we deepened our understanding of how structural elements behave, and further developed our abilities to analyse structures. This linked with 'Steel & Timber Design'. Combining knowledge from both modules, we completed a set of calculations and drawings for a new roof on a sports hall. Each week, there were two two-hour workshop slots dedicated to this project. In these, my class and I were heavily challenged. If we were without a team member present for even one meeting, group progress slowed noticeably. So it was relatively rare that any of us missed one of those classes. Before our college disbanded, teamwork and attendance had thus been of paramount importance in order for the project to move forwards. And then we had to continue our work from home, but with only three 10-15 minute slots with our lecturer and tutor during which we could ask questions. To say that figuring parts of the project out over voice call was difficult is an understatement. Poor WiFi connections meant we had to repeat ourselves more than once; and after we broke away from college, one person in our group made no further contact with us. Our group voice calls used to last up to four hours, and in hindsight, I do not think we achieved a tremendous amount of productive work during that time, in contrast to what we would have managed if we had been in the library together. Despite spending up to four hours on a call, we might not make a huge amount of progress as it was slow working over voice call; whereas, if we had been in the library, in four hours I imagine we would have gotten more work done in the same time. As I lost my part-time job coming into lockdown, I had a lot of spare time I could dedicate to my projects. I worked long hours almost every day, not only because I had the time but because the projects took so long to complete remotely.

Two weeks prior to our college being disbanded, we were due to receive our project brief for 'Fluids and Energy'. After two to three weeks of online learning we were informed we would make a live presentation (in front of an external examiner) and present a report. Some of us personally found this module the most stressful. As many live in rural Ireland where WiFi coverage can be poor on the best of days, we expressed a deep concern that if it crashed or we had trouble logging on in time would we lose marks? Thankfully our voices were heard, and the live presentation was replaced with a 15-minute educational video.

6.5 Reflection on Progress with Skills Development

As I complete second year, I realize my journey to the point of no longer being a *student* engineer is halfway complete. This thought comes with a marriage of feeling excited and feeling apprehensive. While I do not yet feel adequately

equipped to enter the working world, I trust my course director and lecturers to direct us by the end of Final Year to that state of feeling ready. Thus far, presentation skills, public speaking skills, teamwork skills, communicating through different media and time management skills have been developed and highly rewarded. In the second semester of third year we will complete an eight-month Co-operative Placement in Ireland or in England. This will be our initial experience in the workplace.

For all the skills that we began to develop in Semester 1, we continue to be given the opportunity to further develop them in some way. During Semester 1 and half of Semester 2, generic capabilities such as critical thinking and problem-solving have also been developed by us. However, not all of these skills continued to prosper during our time of online learning. We continued to work in teams - only under very different circumstances. Public speaking and presentation skills saw no new development, unfortunately. Personally, I found the fact that the presentations were so frequent during Semester 1 had aided in my comfort of speaking to a large group; although in the second half of Semester 2 and potentially next semester we have had none. However, a new skill was developed in us - adaptability. Our transition to online learning occurred over the duration of a day or two. We rapidly adjusted to solving problems in groups over voice call. Brainstorming over voice call was laboured. My mobile phone and laptop, I would admit, were a big part of my life. But since we switched to online learning, they admittedly became my life.

In the coming academic year, I hope we are provided a safe space that encourages our growth as budding engineers. As our country emerges from the lockdown, there remains the uncertainty of the ratio between in-class and online learning. This frightens me, as I am one who feels the reward of being in class and learning with peers; I eschew the likelihood of more online learning.

6.6 Closing Thoughts

Having completed half of this semester online, I believe I have missed out on some learning opportunities. However, there were some gains after lockdown. The live lectures were recorded, which meant if I did not grasp a concept the first time, I could re-watch the video. Or if I was unable to attend, I could watch it in my own time.

Our learning expedition has come to a halt for now as we begin a summer filled with restrictions. We anticipate what September will bring for us as voyagers re-instating our journey to becoming civil engineers. Our course so heavily relies on teamwork that I fear lest restrictions will not permit us to work in groups (in person). Or even if it was allowed, that our lecturers will not be able to aid us sufficiently, for example, by writing on our group whiteboard or editing what we have written (due to social distancing requirements).

As of now, campus classes are due to commence on the 28th of September with only online classes until then. After this date, during classes, I wonder will the lecturer remain at the front of the room behind a plastic sheet, shielding them from us and us from them. Or perhaps as university students, we will become intellectual hermits, spending all our time attending online lectures from our bedrooms? The overcrowded-during-exam-season Library will have even more so-limited desks. Our Sport Arena, which was in years past a trap for incoming sporty students, may remain closed - as it has been converted into a field hospital for Covid-19 patients.

Overall, I do not think I am alone in sensing that it will be a semester filled with uncertainty. We are able to speculate the fate of our learning, but we will not know what will happen until we are in the situation. Although I scorn the idea of it, we have completed one half of a semester solely online, so who is to say we cannot successfully complete a full one. I have full confidence our lecturers and course director will deliver us to place of being ready for the working world.

7. Conclusion (John Cowan)

I solicited contributions to an account of this course experience in lockdown. I edited down but did not rewrite these inputs. I checked the conflated draft and its frank reports of singular experiences in the face of the demands of the course and of lockdown. All four student authors expressed satisfaction with the final account presented here.

This was a remarkable first year of discipline-based study in an imaginatively designed problem-based learning programme. The highlights for me in these unedited student accounts of what was for them a radical and demanding learning experience are the enthusiasm and motivation embodied in their persuasive accounts of the effectiveness of their self-managed development of core abilities.

We now leave it to readers to draw their own conclusions about what they can usefully take forward regarding the development of valuable graduate attributes in their own contexts, with or without the complexity imposed by the pandemic.

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