AN ANALYSIS OF THE REMOTE COMPUTING SYSTEMS AND SOLUTIONS PROVIDED BY ATU GALWAY CITY SCHOOL OF SCIENCE AND COMPUTING TO STAFF AND STUDENTS

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DECLARATION OF ORIGINALITY

The substance of this dissertation is the original work of the author, and due reference and acknowledgement have been made, where necessary, to the work of others. No part of this dissertation has been accepted for any degree or other award previously and is not concurrently submitted for any other degree or award. I declare that this dissertation is my original work except where otherwise stated and duly acknowledged.

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Abstract

The research question being asked here is what are the most efficient strategies to improve the remote working and learning experience in ATU Galway School of Science and Computing? The aim of the research was to analyse the effectiveness of remote computing resource provision by ATU Galway City School of Science and Computing and thus identify any gaps or weaknesses, so as to be in a position to make improvements. In other words, how well are staff and students able to work or study from locations outside the university when using computing services and systems and could it be done any better.

The methodology used was action research. Action research involves using systematic observations and other data collection methods that are useful for the practitioner-researcher in reflection, decision making and in the development of more effective practices in the workplace. Data collection was undertaken using surveys, semi-structured interviews and observation. This study adds to the knowledge already in the literature, enabling improvements to be made to the provision and delivery of remote computing systems and solutions not only in ATU but elsewhere.

It was found that the systems in use are effective and that the users are satisfied with their levels of knowledge and the training provided. Slow broadband or a lack of coverage in rural areas was the most common complaint. Students from economically disadvantaged backgrounds in particular suffered from a lack of access caused by difficulties in paying for broadband as much as for technical reasons related to the availability or quality of Internet.

It is recommended that students who qualify for the laptop loan scheme or who are identified via a means test should be provided with pre-paid data packages in order to offset the disadvantage they suffer and give parity of access to all.

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List of Abbreviations

AD	Active Directory	OECD	Organisation for Economic Co-operation and Development
ATU	Atlantic Technological University	SSL	Secure Socket Layer
BOLT	Blended and Online Learning Transformation	SPSS	Statistical Package for the Social Sciences
CUA	Connacht-Ulster Alliance	STEM	Science, Technology, Engineering, and Mathematics
GIS	Geographic Information System	SWOT	Strengths, Weaknesses, Opportunities and Threats
GMIT	Galway-Mayo Institute of Technology	TEL	Technology Enhanced Learning
INDEx	The Irish National Digital Experience	UDL	Universal Design for Learning
IT Sligo	Institute of Technology Sligo	USI	Union of Students of Ireland
LYIT	Letterkenny Institute of Technology	VDI	Virtual Desktop Interface
MCQ	Multiple Choice Questions	VPN	Virtual Private Network
NCES	National Center for Education Statistics (USA)	WiFi	Describes a family of wireless network protocols

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Chapter 1: Introduction

Introduction

The School of Science and Computing has been offering a remote learning experience in its Springboard courses for a number of years. Processes have also been in place to facilitate remote access to computing resources for those who need to work from home in a number of differing roles. However, this remote access was the exception or the minority case until the Covid-19 pandemic created a world-wide need for moving the majority of computing access to a remote basis (Ginty *et al.*, 2021). This forced move online has created a new situation regarding remote working and learning where stakeholders have an expectation of remote access to computing resources.

Thanks to the opportunities provided by the historically unprecedented large number of people remote working and learning, that was unavoidable during lockdowns, there has been a lot of research done in this area (Kilcoyne, 2021). I believe I can build on this research and add to the knowledge already in the literature in this more specific area of provision of computing resources which facilitate same. The research I do can eventually benefit a wider audience as many of the issues and potential recommendations would apply to the overall new institute of ATU which not only contains all GMIT but also IT Sligo and Letterkenny IT. Indeed, it would be of interest to any third level educational institution and potentially any organisation that wants to provide remote computing services.

Research Aim

Context of this Research

As someone who works directly in the area of providing technical support to staff and students, as well as having responsibilities in the areas of setting up, administrating, configuring and maintaining computing systems and services in the School of Science and Computing, I am especially interested in analysing the provisions of such systems with a view to improving our offerings through reflection, leading to better decision making in the development of more effective practices. Although lockdowns have ended and the situation where we were forced to work, teach and learn online appears to have passed, hybrid working and learning arrangements remain very much in place. There is a clear appetite from staff and students to continue with some form of either entirely remote or hybrid working or learning arrangements (Cronin and McBride, 2020). This is the case in society at large as well and it is critical that in order to remain relevant and competitive, this organisation must cater to such expectations. There is much talk at the moment of the "great resignation", where workers the world over are leaving their jobs in large numbers (Sheather and Slattery, 2021). Much of this is as a result of people moving to better jobs. Better, in many cases, not only refers to higher rates of pay, but also

more flexible working arrangements. In some cases, the new jobs pay less but the benefits in work life balance and the lack of a commute are what tip the balance. Many promises were made that hybrid working arrangements could continue into the future for those who want to avail of them. Employers who try and force unwilling staff back on-site are finding that those staff are moving elsewhere (Allman, 2021). The same considerations are at play in third level educational institutions. Student enrolment and retention may suffer from a similar issue unless we offer competitive hybrid or remote options. I want to help avoid such concerns and indeed hopefully attract and retain students and staff better than in the past by improving the efficiency and delivery of our remote computing offerings.

The current procedures and practices surrounding provision of remote computing resources within higher education are a result of a rapid response to the imminent need to move on-site activities online and was done without any overarching leadership or sectoral co-operation but rather was achieved by a large number of individuals and groups working separately and reacting to a sudden need (Forum, 2020). It is unlikely that a perfect solution was achieved in such circumstances and indeed it is a fair assumption that there might be inefficiencies and overlaps to be found. I intend in this research to analyse my organisation's rapid response to that imminent need to move on-site activities online, with the benefit of hindsight and the advantage of having time to be more meticulous and considered in my approach.

Research Question, Scope, Aim and Objectives

My research question is, what are the most efficient strategies to improve the remote working and learning experience in ATU Galway School of Science and Computing? I will keep this question in mind as I undertake the research. Ultimately, the output of this research will be a contribution to the existing literature, such as confirming or refuting the findings of previous work in this area and as it is action research, a recommendation for an action that will make a practical measurable improvement to my organisation's remote computing provisions.

The aim of this research is to analyse the effectiveness of remote computing resource provision by ATU Galway City School of Science and Computing. Effectiveness is somewhat of a subjective concept. In this instance, by effectiveness I mean stakeholder satisfaction levels with both training received, and services provided as well as looking at the practical ability to work or learn from home. Were enough tools provided? Were the tools and services fit for purpose? Was it possible for working and learning to happen remotely without a reduction in learning outcomes, work productivity or other negative side effects? What is not within the scope of the research is the overarching teaching strategies used to deliver learning outcomes. Rather the research is concerned with technical and procedural matters that facilitate the delivery of lecturers or working or studying remotely. Another

aspect of remote working and learning that is not within the scope of the research is the emotional and psychological side. Things such as stress, isolation, loneliness, difficulties with focus or other similar matters are excluded from the scope. The areas where I believe I can make a contribution are in the procedural and technical spheres and I will be focusing on those.

The objectives are to identify what is being done well and also to identify any gaps or weaknesses and thus be in a position to put systems or procedures into place to improve the provision of remote computing resources, fill any identified gaps and address any weaknesses identified by recommending mitigating actions. An additional objective is to make a contribution to the literature in terms of confirming or refuting previous findings.

This aim and these objectives will make the research useful to stakeholders as it will lead to an improvement in their ability to work or study from home or other remote locations. Remote working and learning are here to stay so any improvements in those areas will have a positive impact in my organisation's relevance and usefulness. This can only lead to improved attraction and retention of staff and students as well as more effective delivery of its services.

Overview of the Research

Chapter two of this dissertation will contain my literature review, in which I will familiarise myself with current scientific knowledge on the subject area I intend to research. There I identified themes as well as any areas of disagreement. The main theme that led to identifying the gap I ultimately offered a solution to, based on my research, was that of a digital divide, a difference of remote computing experience suffered by those from an economically disadvantaged background. Chapter three will describe the methodology I used in my research, which was action research using Observation, Semi-Structured Interviews and a Survey as data gathering methods. Chapter four concerns my findings, solutions and a discussion and analysis of all the data collected. I identified a gap where students from economically disadvantaged backgrounds were experiencing a reduced learning experience and offered a suggested solution of ATU paying for data bundles for this cohort. Chapter five will contain my conclusions and recommendations, which are that the remote working and learning experience in ATU Galway School of Science and Computing was fit for purpose with high levels of satisfaction from most stakeholders. I recommended the purchase of data bundles for students from economically disadvantaged backgrounds as it was shown to mitigate the disadvantage they experience, and that a scheme should be implemented to offer free data to them.

Chapter 2: Literature Review

Introduction - Teaching was forced Online

A quote often incorrectly attributed to Winston Churchill is 'Never let a good crisis go to waste'. There is some dispute as to the origins of the phrase, but it can be broadly agreed, regardless of its authorship, that there is wisdom in its words. The Covid-19 pandemic and the resulting lockdowns and social distancing that came as a response to it became the genesis of an unprecedented amount of research into remote working and studying and the accessing of computing resources remotely. This fact is mentioned in the following quote by Kilcoyne (2021) in his article, Living and learning with Covid-19: re-imagining the digital strategy for schools in Ireland.

> A broad spectrum of school responses was evidenced in Ireland and has placed the digital strategy for schools under the microscope. Multiple stakeholders eagerly look for evidence of how it had prepared schools for these requirements.
>
> (Kilcoyne, 2021, p. 247).

He is not alone in noticing this trend nor is it localised to Ireland with articles and papers around the globe highlighting this same notable fact. Gadusova (2021, p. 140) explains how the lockdowns changed teaching and learning and makes the observation that, 'The year 2020 will be remembered as the year when social distancing has changed the landscape of education'. Hall (2021, p. 147) agrees with this and states, 'there emerged in the immediate months after the pandemic a body of rapid research on COVID-19 and its implications for education'. Galway-Mayo Institute of Technology (GMIT) as it was known then, currently Atlantic Technological University (ATU) Galway City, is no exception to this reaction to the Covid-19 pandemic and like so many other institutes of higher education and workplaces worldwide, it used this opportunity to study the resulting data and analyse the effectiveness of their response. This is explained in a paper written by ATU staff member Dr. Carina Ginty, named "Building Digital Teaching and Learning Capabilities with DigitalEd.ie in Response to a Global Pandemic" for the All Ireland Journal of Higher Education (Ginty, 2021).

In the chapter she contributed to the book 'Building Digital Teaching and Learning Capabilities in Higher Education' which contains several case studies based in GMIT, Ginty (2021, p. 9) accurately describes in the following quotation, the sudden shift to remote teaching and learning and the opportunities and challenges that came as a result of that move.

> In March 2020, the physical closure of our five campuses in GMIT, forced everyone online in a hurry and transitioned our learning, teaching and assessment activities

> to a new platform. The COVID 19 emergency has fundamentally changed the way we all live and work, and this is having an enormous impact on the teaching and learning experience in GMIT. The transition has been challenging, but it has also presented a number of opportunities for developing digital capabilities among the teaching community and alternative strategies for student engagement.

These case studies are important and highly relevant as it takes in the lead up to the covid-19 lockdown and continues to follow the progress of staff and students well into 2021. This gives a more accurate picture of student and staff engagement with remote teaching and learning over a critical period of time when major changes were happening, and adjustments were being made by all stakeholders.

This idea of the pandemic 'forcing' a move to online learning, teaching and working is echoed throughout the literature. Hašková (2021, p. 3) notes in a paper entitled 'Learning to teach and learn (not only foreign languages) during the coronavirus pandemics', in the European Scientific Journal, that 'The coronavirus pandemic, within a few months of its outbreak, has dramatically changed the lifestyles of the entire world, with billions of people being forced to stay at home, observe self-isolations, and work and learn from home'. They also note that, 'The coronavirus pandemic with its closures of schools and other learning spaces has dramatically influenced the operation of all kinds of schools and educational institutions, forcing teachers to move to the online delivery of lessons'.

Further evidence of this move online being thrust upon the educational and business institutions of the world comes from, Ní Uigín (2021, p. 227) who states that the move online was 'engendered out of necessity' and later they repeat this same sentiment, 'forced us to embrace blended and online learning at an accelerated rate in 2020'. Clearly there was little choice in the matter, and everyone had to adjust to the new normal of working, learning and teaching in an online environment.

Research Question

The question that this research is asking is, what are the most efficient strategies to improve the remote working and learning experience in ATU Galway School of Science and Computing? This research will analyse ATU Galway City's provision of remote computing systems and solutions to staff and students within the School of Science. It will be able to take advantage of the forced move online caused by the global context of covid-19 and the resulting lockdowns. This provides a unique opportunity to study such provisions using an unusually large dataset. Ordinarily, only a fraction of courses would be offered online but now it is possible to analyse these systems as they attempted to cope with the entire student body and all staff being required to deliver, support and administer or attend such courses. The research will attempt to identify any gaps that might be addressed by an action that could be taken as part of the action research and also confirm where the approach

currently taken is effective and fit for purpose. To that end, the following relevant areas of interest were identified in the literature.

The Economically Disadvantaged are a special case

Being forced online did not affect everyone equally. There was a marked difference in how individuals and even countries were hit, as evidenced by this quote from a Nigerian journal paper.

> Covid-19 pandemic has affected higher education in Nigeria. The closure of schools meant that administrators of higher education had to come up with strategies to ensure that learning continues during the lockdown. Some Nigerian universities particularly the privately owner universities quickly moved from traditional face-to-face teaching method to remote education.

(Ebohon *et al.*, 2021, p. 2)

The African continent was especially hard hit by the pandemic with the majority of the colleges worldwide that ended up cancelling teaching activities altogether being from Africa. Over 90% of third level teaching institutes worldwide reported moving to remote teaching in an international survey from 2020. Around 7% simply stopped all teaching activities, with the majority of those that cancelled classes being from Africa (Marinoni *et al.*, 2020). This difference between the first and third worlds is telling. Remote teaching and learning are as affected if not more affected by economic factors as they are by technological or knowledge-based issues. If students or teachers lack the means to have acceptable levels of broadband available to them in terms of speed, data quotas or quality of connection, or worse still, do not have Internet at all, then remote teaching and learning become impossible.

Absent the ability to move online, unfortunately some international institutions and some economically disadvantaged individuals struggled during this time. The 'haves' and the 'have nots', includes the concept of Internet availability and speed, and the divide between those with good Internet and those without became a stark reminder that this imbalance exists and that the effect of lockdowns was far more negative for some than for others. For example this quote from a paper about "Teaching in the time of Covid, a student perspective", highlights that fact, 'Internet connectivity issues were serious enough to interfere with students ability to attend or participate in their course at least occasionally for 45% of students, with 16% of students experiencing such problems often or very often.' (Means and Neisler, 2021, p. 15). Identifying those with an economic disadvantage is problematic for researchers in Ireland as granular data at the household level is not easily available to researchers. In a paper analysing uptake of broadband the researcher expresses his frustration in this regard, 'There is also no information on household incomes at small area level in

Ireland, therefore county level income data was used instead.' (Lyons, 2014, p. 22). Such limitations can make those at a financial disadvantage somewhat difficult to identify for researchers and other strategies need to be employed.

Students from a disadvantaged economic background can be difficult to attract to third level education in the first instance and once enrolled retention can be a problem. Researchers looking at education uptake remarked, 'It is a particular challenge for higher education to make inroads into the under-representation of the lower social groups.' (Yorke and Thomas, 2003, p. 64). Historically the emphasis was on encouraging the enrolment of older students, those who missed the first opportunity to attend college immediately after secondary school. But encouraging better participation has more recently shifted its focus to the enrolment of disadvantaged students, those from social classes whose participation rates have always been low up to this point. (Higher Education Funding Council for England, 2001). These British papers use phrasing mentioning class in a way that seems anachronistic, but the fact remains that those from a background of economic disadvantage need additional assistance. That assistance might well come in the form of loaned devices or help with getting them reliable Internet in their homes to allow for full participation in remote learning activities.

There is a Practical Vocational focus

Institutes of Technology in Ireland such as GMIT, previously known as Regional Technical Colleges and now evolved or about to evolve into Technological Universities come from a tradition that valued practical, vocational education. This is education that values training aimed at specific useful job skills and knowledge. This has been defined as follows, 'The vocationalist view of learning, one of operational competence, holds that employers want higher education to more closely attend to what they mean that they need in graduates they recruit.' (Kirschner, 2001, p. 3). We can safely assume that after the merging of GMIT, Sligo IT and LYIT that the new entity named Atlantic Technological University will not completely abandon this historic ethos and will want to continue to deserve the well-earned reputation of producing graduates with strong practical knowledge and skills. Thus, we can expect a focus on the use of and training in the latest tools and methods, including remote teaching and learning methods. This supposition is supported by the content of GMIT's Strategic Plan 2019 – 2023 which specifically includes such values in its mission statement and strategic actions and expected outcomes (GMIT, 2019).

There can be a reluctance to adopt new technology

Despite provision of and training in new methods and tools, students can still be reluctant to take on new technologies and modes of learning and they can be resentful of the time and effort involved in

adapting to effectively using these unfamiliar tools, as shown in the following quotation taken from an article from a few years ago before the pandemic began.

> Students' resistance to using technology was manifested at various levels between mild and severe. Mild resistance could be detected through students' anxious questioning of the new methods that involved technology… These technological problems were frustrating and, consequently, some students became disengaged.'
> (Deeley, 2018, p. 443).

Of course, by now students have all become accustomed to what were new methods in 2018, having been obliged to learn and use such previously unfamiliar tools as Microsoft Teams, Zoom and bespoke remote proctoring tools, to name but a few. By 2017, prior to the above observation, online courses had already become commonplace compared to a decade earlier, as seen in this quote, 'Despite the challenges faced in developing and delivering effective online courses, participation in online courses is becoming widespread.' (Khan *et al.*, 2017, p. 113). Yet students were still railing against using new technology the following year. The point is that in the ever-changing landscape of technology one is constantly required to retrain and adopt new methods and such reluctance will continue to manifest itself as a normal part of the human condition. This ubiquitous requirement for flexibility means people are resigned to a certain amount of retraining, upskilling and adaptation to new methods and tools. An emotional and psychological tug of wars exists in us all between the resistance to change and acceptance of its inevitability when it comes to using computing systems. Evidence of this is in the oft heard phrases 'Why did they change PowerPoint? I can't find anything!' or 'Bring back the old Facebook' and similar cries of despair as menu items and features are moved, deleted or updated in what used to be familiar software applications and platforms. Much of these changes are driven by improvements in design intended to garner new users for these platforms. Such new users would not know or care about older established designs and would benefit from the simpler learning curve whereas existing previous users tend to remain and adapt to the new design due to a sunk cost of time and effort and a reluctance to learn an entirely new system. This despite their loud and plaintiff protests against such changes (Lampe *et al.*, 2008).

On-site versus remote teaching and learning

There are several key differences between traditional in person teaching and remote teaching. In particular, traditional teaching is limited to a specific location. This means that the learners and their tutor have to be physically present together at a set time and place. Traditional teaching needs to be delivered in real time. It is by its nature inflexible and timetabled. It is entirely controlled by the lecturer and is disseminated in a linear fashion. Remote teaching and learning are more flexible as

they are not limited in the same ways. Pre-recorded lecturers can be consumed at a time convenient to the student. Equally the delivery and recording of specific lecturers do not need to happen at a set time and place. In some cases even the order in which some of the material is learned can be decided by the student (Horvitz, 2007). Certainly, podcasts were a practical solution to the problem of delivering lecturers during the forced move online and they were a popular tool that was widely used by educators as described in this following quote.

> Given that podcasts are digital, highly versatile in terms of length and content, and are offered asynchronously, they provide a viable tool to safely deliver content to students in the wake of the pandemic and may be robust to changes in society over time.

> (Strickland et al., 2021, p. 4).

Set against that we must be cognisant of the fact that some students dislike podcast style learning and express a marked preference for in person teaching and learning. 'Another significant challenge was related to student preference for lectures.' (Kay, 2012, p. 825). It is interesting that students do seem to prefer live lecturers, even in an online or remote delivery scenario, as described in this quotation from a paper on "Online Learning Experiences of Irish University Students during the COVID 19 Pandemic" in the All Ireland Journal of Higher Education, 'Students spoke highly of the classes that have interactive activities which allow them to engage with their instructors and classmates. These activities were commonly associated with live virtual sessions.' (Yang, 2021, p. 9). This is contradicted somewhat in a different study on lecturer social presence, where students ranked teacher created videos as their highest preference, where the researcher reports, 'most students (56%) rated instructor-created videos as most important to connecting with the instructor' (Conklin and Dikkers, 2021, p. 141). Social presence and overall satisfaction with perceived learning outcomes are different metrics and these results should be taken in that context. To an extent we are comparing apples and oranges when we compare social presence and satisfaction levels of perceived learning outcomes, although there is some overlap in practice.

Snart (2010) explains the factors that should be borne in mind when analysing such data. We must consider that the student preference might be less about face-to-face versus online and more about live and interactive versus recorded material which prevents student interactions. Synchronous and asynchronous teaching and learning preferences muddy the waters slightly and this must also be considered. It is entirely possible that the unfamiliarity with remote learning had a greater influence on students than the actual delivery method. He does warn of a dilemma in the following quote, where there is a conflict in the wants and needs of opposing groups who either fear or embrace technology.

'Perhaps the fundamental challenge faced by students, faculty and administrators alike, as we think about technology and education specifically in term of making hybrid learning as effective as it can be, is exactly how to navigate the seemingly diametric poles of technology enthusiast and technology sceptic.'

(Snart, 2010, p. 5)

Student Engagement

Whether familiarity with online classes has softened this negative attitude of some stakeholders is a question worth addressing in the research. It is natural to crave the familiar and distrust the novel and unknown. It is possible that familiarity may have bred comfort and acceptance rather than the proverbial "contempt". Data suggests that perceived losses in learning reported by students may simply be a matter of perception and not actually based in reality (Rovai and Barnum, 2007). They explain this by suggesting that students imagine an idealised face-to-face classroom experience with ample time for questions and discussions, for example in this excerpt, 'Consequently, perceptions of on-line learning pale in comparison to an individual's idealized learning environment.' (Rovai and Barnum, 2007, p. 70). It cannot be assumed that students are equally as engaged in a live remote session as they might be in a face-to-face classroom. A preference for live remote sessions over recorded ones is not necessarily confirmation that live remote sessions are equally as interactive or effective as face-to-face classes. The data provided by the more recent studies, conducted leading up to and during the lockdowns are where those answers lie. Significantly a poll conducted by Khan (2017, p. 107) seems to confirm the concerns of older papers regarding student engagement. They point out that, 'In a recent poll conducted by the authors, 100% of the respondents considered student engagement a challenge regardless of the number of years they have been teaching online'. This confirms that student engagement is an ongoing challenge and a significant one at that since even experienced teachers continue to struggle with it.

Potential Academic Dishonesty

One of the biggest difficulties, if not the biggest, in the provision of education to online students during the covid-19 pandemic was the issue of avoiding scenarios where students might exhibit dishonest behaviours during exams conducted remotely. The following quote describes the issue well.

Student academic dishonesty, which in practice translates to cheating and plagiarism, is by far the most frequently discussed challenge in higher education today with regard to the shift of examinations online. Institutions and faculty have a long tradition of supervising students when taking examinations on-site. Now that courses and examinations must be delivered online, the capacity to control

> students' actions is reduced. Students working from home, or elsewhere, may be able to access unauthorised resources and materials, communicate with external people or even ask someone else to take examinations for them.

> (OECD, 2020, p. 2)

Although remote proctoring software is available and has been used with varying degrees of success, it appears that a different approach, that of using project work, individual or group based, online presentations and open book style exams was by far the most popular solution with both teachers and students. This quote explains some of the thinking behind how and why examinations were changed to adopt to the remote learning circumstances.

> With the transition to online teaching due to the COVID-19 pandemic, the need for identifying effective methods of assessment has become paramount. The methods of traditional summative in-person, paper- and-pencil exams could not be adapted to the online environment. In case of unsupervised (non- proctored) exams it was impossible to ensure students' academic honesty. Some universities have offered remotely supervised (proctored) examinations, which has been a rare exception. The pandemic prompted teachers to innovate their assessment practice and apply formative assessment methods as an alternative to traditional summative assessment. They have started using tasks such as e-portfolios, online learning journals, blogs, online presentations, creative writing, and open-book exams, which present golden opportunities to involve students in the assessment process.

> (Koris and Pál, 2021, p. 11)

This was not universally true as evidenced when Michigan Technological University, Houghton, MI moved its hands-on Mechanical Engineering courses online, and is described in the follow excerpt.

> 'Assessments, including group and individual assignments, were mostly unchanged during the transition to remote instruction, as was the prevalence of group work and team collaboration on assignments, though now conducted using remote tools.'

> (Johnson and Barr, 2021, p. 211).

Exams have needed to be redesigned in a variety of ways to ensure fairness. One solution is to change what was a written exam into an oral presentation or interview style test. Another common practice in online tests is to have a varying set of randomised questions such that each student is answering different questions in a different order (OECD, 2020). Although some overlap occurs this limits the potential for collaboration or helpful interactions but comes with a cost. The lecturers need to compose and ultimately correct a larger set of questions than in a traditional written examination.

Annette Cosgrove outlines some of the specific strategies used in the School of Science and Computing in ATU Galway City, known then as GMIT, in a chapter she contributed to the book, "Building Digital Teaching and Learning Capabilities in Higher Education". She lists options that were used such as traditional end of term style exams but with handwritten answer sheets uploaded using the Microsoft Office lens app. The students would undertake the exam in the normal fashion, but at their homes. Then the handwritten answer sheet would be scanned in and uploaded to Moodle, the Learnonline software used by the college, within a limited window of time. This was typically 40 minutes. MCQ or Multiple-Choice Questions, were another solution used. The questions were randomised for each student. Use was made of the Safe Exam Browser. This software prevents students switching between screens in an exam session so they couldn't look up answers or consult digital or online reference materials in a 'closed book' style exam. Virtual live presentations via Microsoft Teams were utilised and of particular use was screen casting as a tool for software development students to demonstrate gameplay in games that they had developed. Podcasts of project presentations and weekly worksheet submissions were also used (Ginty *et al.*, 2021).

Digital Divide

Fairness is a sword that cuts both ways. An inequality in terms of access to technology or a quiet place to take an exam can disadvantage some students. This important fact is pointed out in an article by the Organisation for Economic Co-operation and Development on the topic of Remote online exams in higher education during the Covid-19 crisis. Here, we see bandwidth connections mentioned alongside other factors. This is a trend in the literature and remarks about difficulties experienced by those with poor Internet is a recurring theme, as seen in the following quotation.

> During on-site examinations, all students gather in the same room to take a test in similar conditions (timing, available material, etc.). In the context of off-site online examinations, students do not benefit from the same working conditions. They often have different levels of technological equipment (screens sizes, computer speeds, bandwidth connections, etc.). Similarly, some might not have access to a quiet room to concentrate while taking their exams.

> (OECD, 2020, p. 3)

These complaints are echoed in the Union of Students of Ireland (USI) 2020 report, for example where they summarise, 'This report outlines some of the shared experiences of students over the last few months: of connectivity problems and inadequate study spaces, of lost employment and lost motivation' (Ireland, 2020, p. 2).

The uptake of broadband in a given geographical area is determined by a number of factors. Among them are education, socioeconomic factors, race, and distance to the exchange. Speaking a non-English language actually slightly increases the uptake by 3.5% unless there are no fluent English speakers in the household which more than offsets that figure by 18.6% (Prieger and Hu, 2008). Although the Irish speaking Connemara Gaeltacht is within the catchment area of ATU Galway City and many students from there attend what is to them one of the two geographically closest universities, there wouldn't be any English language difficulties in that cohort. No monoglot Irish speakers remain at this point in history. Native Irish speakers such as me are at a minimum bilingual in Irish and English. The issues experienced by Gaeltacht dwellers would be infrastructural and economic, not linguistic.

Hybrid Learning

The following quote offers a definition of blended or hybrid learning, 'Hybrid learning, or blended learning, is known as a mixed mode of instruction, formally combining traditional face-to-face instruction and pure online learning' (Olapiriyakul and Scher, 2006 p. 228). In their guide to establishing hybrid learning courses, Olapiriyakul (2006) outlines the requirements for providing a blended learning environment. There must be instructional technology to support pedagogy for those doing the instructing. Students need a range of learning supports provided to them so that they are capable of interacting with and are gaining benefit from the blended learning environment. There needs to be a clear and easy, established method of communication between teacher and student as well as between students and each other. They are supported by Khan (2017, p. 111) in this assertion, when he explains, 'Another significant piece in the development of a community of learning in an online course is communication. Communication in an online course is a critical component in the exchange of information in verbal and written forms'.

Online learning and teaching are not one simple thing. Rather they are a range of activities, tools and delivery methods such as, but not limited to, the use of multi-media materials, podcasts, simulation software, the use of social networking platforms, mobile as well as fixed platforms and eLearning tools (Keengwe and Kidd, 2010). A series of surveys were conducted by the National Center for Education Statistics (NCES) in the United States over a period of years with the first undertaken in 1995, the second in 1998, the third in 2002 and the fourth in 2007. This represents a decent longitudinal study up to that point in time. In 2007 in the United States there were 12.2 million enrolments in distance learning courses. Of those, 77% were fully online and 12% were blended (Parsad *et al.*, 2008). Even in the decade or more since those times the technology and tools available and the public's familiarity with and uptake of online offerings of varying kinds has dramatically increased so it can be argued that

these statistics have already become more than a little dated. As this space continues to evolve into the future, the range of tools and delivery methods can only grow as students and teachers alike become better versed and more capable, leading to greater expectations and engagement from learners and better delivery and content provision from teachers.

Any future development in these areas should be undertaken with sustainability in mind. This is of concern to younger people in particular but has broad approval in all age ranges (Hedviga *et al.*, 2021). Remote teaching and learning can help the environment in terms of reduced commuting and the resultant reduction in carbon emissions, reduced use of paper and a reduction in the need for centralised energy consuming structures to house in person activities. Unless we move to 100% remote solutions there will always be a need for facilitation of face-to-face activities, but any reduction is helpful.

Science subjects taught in ATU Galway City, all include laboratory based practical hands-on elements. Pods of socially distanced groups were taught via a blended delivery method with some on-site activities, but they mainly used remote learning for the theoretical elements of their coursework (Ginty *et al.*, 2021).

This type of blended or hybrid teaching and learning approach was used by the School of Science and Computing by necessity when lockdowns happened. Science subjects require a certain amount of practical laboratory work as pointed out in a paper on exams in higher education, 'In some domains, student evaluations cannot rely on written tests to measure acquired knowledge and skills because direct observation of students actual capacity to perform a practical task is required.' (OECD, 2020, p. 2). One way to provide certain types of laboratory-based demonstrations is to use webcams and this approach has been used successfully in some colleges, as explained here.

> 'Interacting (remotely) with the hardware, including using strategically placed webcams, to understand, "if I change this, then this happens," providing instant reinforcement and understanding of the physical system behaviour, limited to systems that do not require human interaction.'

> (Johnson and Barr, 2021).

However, one cannot mix chemicals, dissect a fish or use a Bunsen burner online and there are limits to the benefits of watching someone else perform these tasks. Computing classes were a notable exception as they could in theory happen entirely online but even those adopted the hybrid teaching model. Since students were already on-site in pods of eight to ten for practical science labs it made sense to bring those same pods into socially distanced computer labs. Training was provided to

lecturing staff through the BOLT (Blended and Online Learning Transformation) initiative in anticipation of the new academic year starting in September 2020 (Ginty, 2021) as explained here.

> For the BOLT initiative, GMIT Teaching and Learning Office co-ordinated the delivery of 31 sessions over three weeks in June and a further 35 sessions in September, to help staff prepare for remote teaching and learning in the Autumn/Winter. Over 4,800 registrations were recorded across 66 sessions (2,500 in June and 2,300 in September) with participants from GMIT, LYIT and IT Sligo engaging in multiple sessions from Microsoft Teams, Moodle, Advanced PowerPoint and Digital Teaching and Learning Pedagogy.
>
> (Ginty, 2021, p. 6)

Cyber Security

Olapiriyakul (2006) explain that the speed and security of the systems used in hybrid teaching and learning are an important factor. There are unique factors related to the remote aspects of hybrid teaching that add security concerns that must be addressed. Speed or rather a lack of it, can make learning or teaching next to impossible for the remote users. Above all, learning and teaching activities must be supported. Any breakdown in the ability to teach or to learn caused by these issues must be addressed quickly and efficiently. Again, as with other papers and articles from the pre covid-19 pandemic era, some of these observations may lack relevance or at the very least be less of a concern in the current climate. Resources have been put into place on a massive and unprecedented scale in a global reaction to the forcing online of so many activities that historically happened almost entirely face-to-face. Training of personnel and hardware upgrades became high priorities and IT departments the world over suddenly found that they had deep pockets as emergency budgets were made available by public and private organisations alike. Security concerns can be mitigated through following best practice, for example the use of Secure Socket Layer (SSL) and Virtual Private Networks (VPN) (Steinberg and Speed, 2005). A recurring theme is that money can solve a lot of problems and the lack of finances can make the online experience very different for some stakeholders.

Satisfaction Levels in STEM

Science, Technology, Engineering, and Mathematics subjects, known as STEM subjects, differ from non-STEM subjects in terms of satisfaction levels after the move to online teaching and learning as is shown by an illustrative national study conducted in the spring of 2020 in the United States. The study found that student satisfaction levels dropped after their courses moved fully online. There was a notable difference between STEM and non-STEM with the number of non-STEM students, who reported being 'very satisfied' being 27% as opposed to STEM students who came in at only 15%. This

difference existed before the move online, with 60% of non-STEM 'very satisfied' before the move online and only 47% of STEM 'very satisfied' when classes were onsite (Means and Neisler, 2021). This proportionally greater drop in satisfaction among STEM students once fully online is evidence that a hybrid or blended approach is required for that type of subject matter.

Barriers

In a paper titled "How does the pedagogical design of a technology-enhanced collaborative academic course promote digital literacies, self-regulation, and perceived learning of students?", Blau (2020, p. 9) warns the Digital Literacy Framework (DLF) that 'findings suggest that the DLF needs to address not only cognitive and social-emotional literacies, but also technical literacies such as the ability to quickly adapt and efficiently use new technologies'. Although Blau is concerned with technical literacies it can be logically inferred that accessibility issues or technical difficulties could also be a barrier experienced by students and staff alike when remote learning or teaching. There are barriers specific to remote teaching in particular, as explained in a paper on active learning and student engagement, 'Online course delivery faces additional barriers to engaging students not typically present in face-to-face courses' (Khan *et al.*, 2017, p. 107).

Nelson (2005) examined barriers experienced by administrators and faculty when providing remote learning. They found that the main concerns in order of most important to least were as follows. Lecturers felt that there was a lack of sufficient payment for the time and effort they were putting in to developing and delivering content for their students. There was a perception among teachers that there was a marked lack of incentives for those who undertook remote teaching, making them feel it was not worth the effort to partake. Concerns were expressed about the program development costs being too high or that the money could be better spend elsewhere. There was a concern that 'hands-on' teaching would be impossible, so any lecturers that delivered a practical subject tended to dismiss remote learning out of hand as impractical to deliver remotely. Many tutors had worries about increased workload being added to an already busy schedule. There were also fears that no face-to-face and a lack of personal contact would be a problem and that course quality could suffer.

These concerns came at a time well before online delivery became more common and we must take the different context and situation into consideration when considering the attitudes and opinions of staff and students back in 2005. Khan (2017, p. 111) addresses the concerns regarding student engagement and the use of active learning and offers some solutions, 'there are several strategies for effectively incorporating and practicing active learning in non-face-to-face settings.'

In the time since the forced move to online teaching and learning there may well have been a shift in the opinions held due to recent circumstances. It is important to look at more recent data such as the national survey that was conducted by the National Forum for Teaching and Learning in December 2019 and updated in May of 2020.

Important Surveys on the topic

INDEx Survey of Students and Staff in higher education

The Irish National Digital Experience (INDEx) Survey of students and staff who teach in higher education is informative about the overall experience on a national scale in Irish third level institutions during that more recent time period when covid-19 was exerting its influence and driving the need for remote learning and teaching. Among its key findings were the fact that students and teachers want more digital teaching and learning going forwards. The students understood more, enjoyed the experience more and felt more independent. Over two thirds of teachers said they would like to use more digital teaching methods. The students also expressed a preference for more digital learning (Cronin and McBride, 2020).

In terms of support, the students reported that their lecturers were the main support in learning to use digital technology in their course. More than one third of lecturers confirmed that they got regular opportunities to develop digital skills. Half believed that above average support was given to them. However, a need was expressed for more time to develop digital teaching materials and delivery methods. The digital tools that were most valued by students were the ability to have access to recorded lecturers and doing polls or quizzes (Cronin and McBride, 2020).

The top suggestion from students was that they needed better, faster, more stable WiFi. Device ownership was high but not universal. Interestingly, 80% used a mobile device to support learning despite having access to a laptop in most cases (Cronin and McBride, 2020). We must bear in mind the limitations of such mobile devices, as explained in this quote.

> 'Most learners have some sort of mobile device and having access to learning while on the go increases the chances of success. The challenges are that the mobile devices have limited resources such as viewable area, limited memory and processing power'
>
> (Khan *et al.*, 2017, p. 110)

A total of 25% stated that it would be useful to have a laptop on loan, strongly suggesting that some devices are lacking in power or are otherwise unsuitable for learning. It was noted in the report that students in Ireland were not as likely to have reliable WiFi available to them compared to students in

the United Kingdom. In the conclusions section, the INDEx report states that reliable WiFi was 'arguably the most important' and 'improving access to reliable WiFi must be a priority' (Cronin and McBride, 2020, p.59). The report concludes 'These findings suggest caution in assuming that all student devices are equally suitable or reliable, particularly during the current period of institutional closures with students relying on access to personal devices, software and WiFi in order to take part in learning and assessment.' (Cronin and McBride, 2020, p. 11).

Additionally, it has to be factored in that many students and lecturers were new to the experience of remote learning and teaching as it was little used outside online programmes before the covid-19 pandemic forced the move online. Notably they say, 'Until the recent sudden shift to remote/online learning, teaching and learning in a live online environment was largely considered the purview of those who taught or were enrolled in online programmes, or those who support them.' (Cronin and McBride, 2020, p. 5).

Union of Students of Ireland Survey

The Union of Students of Ireland (USI) conducted their own survey in 2020 focused on the student experience (Ireland, 2020). Representing more than 374,000 students in over thirty colleges, this organisation is well placed to gather good data. The following significant recommendation of that report is of particular interest.

> 'COVID-19 has exposed deep inequalities within society, including a digital divide with many learners being left behind due to lack of access to devices and inadequate WiFi connection. The third-level sector has worked to address some of these issues, and these efforts must be complemented by the government through enactment of the National Broadband Plan and funding to enable the purchase of devices for students.' (Ireland, 2020, p. 2)

Connectivity

The survey asked questions on the topics of Mental Health and Wellbeing as well as Accommodation and Finance but the section of most interest to this research was the set of questions relating to Learning Teaching and Assessment. The key findings were broadly in line with the INDEx survey and confirmed its results. For example, around a third of respondents reported issues related with access to WiFi and online learning content. Indeed, one of the key recommendations of the report was that provision should be made for students who lack access to devices or who live in low connectivity areas (Ireland, 2020).

Emotional and Motivational Issues

Other key findings were that 35.84% reported a lack of opportunities to engage with other students, 65% felt that learning outcomes changes significantly as a result of covid-19, and that their main sources of support were peers, staff and college resources. Far and away the greatest issue at a whopping 80% was a lack of motivation. One unavoidable negative consequence of the lockdowns, especially during that time when Irish citizens were prevented from leaving a 2 km area, later to become 5 km, was not a technological or procedural one but simply that the need for human contact, validation and encouragement was not being met. Students suffered from a lack of motivation due to the physical isolation and the emotional and social damage that resulted (Ireland, 2020). The 2 and 5 km lockdowns were not entirely negative and imaginative use was made of them by the Heritage Council and National Museum who launched an initiative for schoolchildren learning geography called 'Know you 5k' described as, 'Using a 2 km/5 km radius helps pupils to focus on local amenities by noticing, exploring and documenting local human and natural geographical features.' (Usher and Dolan, 2021).

Key recommendations of report

The key recommendations of the USI report were as follows. The students wanted more structure in the means of accessing online content, in particular they wanted better consistency in the online platforms used. This speaks to a frustration of having to learn a number of different platforms and a wish that one standard be chosen and adopted. Those with connectivity issues needed to be provided a solution to accessing online content. Students from all backgrounds needed to be able to access content, so content needs to be screen reader compatible. Here is where the principles of Universal Design for Learning (UDL) would be useful. ATU Galway City is currently in the process of implementing UDL and has formed a steering committee, of which this researcher is a member. The report went on to recommend that training and support for using the different digital tools was required. Because the lockdowns in place at the time the survey was done prevented physical access to some resources such as libraries, there was a recommendation that such resources be made available online. There was a request that communication should be improved and that lecturers should avoid bunching assessment deadlines. There was a call for more government funding for tertiary education. Last and certainly not least was that provision be made for students who lack access to devices or live in low connectivity areas (Ireland, 2020).

National Forum for the enhancement of teaching and learning in higher education

The National Forum (2020) for the enhancement of teaching and learning in higher education published a report in response to the forced move online in which they made the following statement and posed a question.

> The enormity of what was achieved through dedication, collaboration and innovation in moving teaching, learning and assessment online, without warning, is remarkable. Extraordinary goodwill was demonstrated by those who learn, teach, support and lead across higher education and much was learned for the future. In an effort to capture and share this learning, in May 2020, the National Forum invited key contacts across institutions to respond to one simple question:

> What do you know now, with respect to teaching and learning, that you wish you had known before this all began?

> (Forum, 2020, p. 3)

Ten Insights from report

Based on the responses to this question, the forum published ten key insights. Briefly, they are as follows. 'In the right circumstances, the impossible can become possible' (Forum, 2020, p. 5). Necessity is the mother of invention and the report found that the pandemic forced all the stakeholders to find solutions and embrace new ways of teaching and learning. 'Teaching and learning was relatively well positioned to respond to this crisis' (Forum, 2020, p. 5). Had the crisis happened a number of years earlier the education sector would have been less prepared. Training and preparedness had been informed by research and thus the sector was well positioned to respond and adapt. 'Assumptions, expectations and perceptions have been disrupted' (Forum, 2020, p. 6). There is no substitute for real world experience. Lessons were learned, assumptions were tested and either proven to be true or shown to be false. Fears were allayed. 'Online/remote teaching and learning poses challenges for particular fields of study' (Forum, 2020, p. 6). It was found that certain activities such as practical lab sessions were more challenging to accommodate via remote means. This is of particular interest to this research as the School of Science and Computing has a large practical component at its core in many subjects. 'In-person interaction matters greatly to both staff and students' (Forum, 2020, p. 6). Staff and student wellbeing suffered, and it was more difficult to identify those who might be struggling in the absence of in person contact. 'Teaching and learning staff became the frontline workers of higher education' (Forum, 2020, p. 7). Lecturers and support staff became the de facto frontline workers as these were the only contact many students had under

lockdown conditions. 'Between in-person and online/remote teaching and learning there are differing pedagogical considerations (Forum, 2020, p. 7). It was noted that both the traditional methods and remote teaching had advantages and disadvantages and that one could not be said to be better than the other. Each comes with its own pros and cons. It can be deduced from this observation in the report that some element of remote teaching will remain long after the pandemic is over so that the advantages of both methods of delivering education are gained. This validates the blended approach taken by the School of Science and Computing. 'There is an increased appetite to re-think traditional assessment practices' (Forum, 2020, p. 8). Academic integrity and the practicalities of assessing students remotely forced academics to rethink much of their methods of assessing and examining students. 'Lines of disadvantage were re-drawn or deepened' (Forum, 2020, p. 9). Students who are disadvantaged rely more heavily on services they can access on campus. Conversely, it was found that students with disabilities often found it easier to learn and take assessments remotely. This positive effect for disabled students is dependent on proper supports being in place such as text to speech and similar tools. (Ireland, 2020). 'Policies came to the fore' (Forum, 2020, p. 9). Policies needed to allow for the new normal. Whatever systems are in place must be fair and not disadvantage anyone while allowing for the business of teaching and learning to continue under remote circumstances.

Building Digital Teaching and Learning Capabilities in Higher Education

Having looked at the general situation in Ireland, logically the next move is to narrow the focus and examine the more specific situation in the organisation which is within the scope of this research. DigitalEd published a book of case studies from across the Connacht-Ulster Alliance, of which Galway-Mayo Institute of Technology was a part. The book defines DigitalEd as follows.

> DigitalEd.ie is a Digital Teaching and Learning education platform, providing access to the digital learning pathways and a suite of resources available to all staff. The site provides a gateway to help CUA staff build digital capabilities and pedagogic expertise, in order to design, deliver and support flexible and online learning programmes.
>
> (Education, 2021)

The Connacht-Ulster Alliance or CUA is the name given to the strategic alliance of Galway-Mayo Institute of Technology (GMIT), Institute of Technology Sligo (IT Sligo) and Letterkenny Institute of Technology (LYIT). These are the three third level educational institutions along the west coast of Ireland that merged to become Atlantic Technological University (ATU) on April 1st 2022 (Kerrigan, 2020).

Themes identified in case studies

'Building Digital Teaching and Learning Capabilities in Higher Education', which is the first of a series of books of case studies produced by DigitalEd, identified eight themes which are based on case studies from across the CUA, or Connacht Ulster Alliance. The CUA has since decided to adopt the name Atlantic Technological University for the combined new third level institution that came into being in April 2022. The most relevant themes are those of 'Student engagement and Technology Enhanced Learning (TEL)', 'Supporting Students in an Online Learning Environment' and 'Supporting Academics in an Online Teaching Environment'. 'Universal Design for Learning (UDL)' is also of interest as many of the tools and solutions provided to those students with disabilities or accessibility issues rely heavily on technology and remote access (Ginty *et al.*, 2021). It is important to note that UDL is not limited to that cohort and has a broader scope. 'A review of awareness of UDL among academic staff identified that (i) majority of staff did not understand UDL (ii) concept was viewed with scepticism (iii) it was considered to be only related to students with disabilities/accessibility issues' (Ginty *et al.*, 2021, p. 23). That subset of students with disabilities/accessibility issues is what makes that theme relevant to this research. This is supported by the Union of Students of Ireland report on their 2020 survey which had as one of its key recommendations that tertiary educational providers should 'Ensure that online content is accessible for students from all backgrounds e.g. that text files are screen reader compatible.' (Ireland, 2020, p. 6). Additionally, the MSc in Design and Innovation for which this dissertation is being submitted is concerned with the principles of universal design, so it is fitting that the research includes that aspect as well. Universal design should be at the forefront of our minds in any endeavour as it is important to be as inclusive as possible and reach the widest possible range of people with our offerings, whatever those offerings might be. The case studies in 'Building Digital Teaching and Learning Capabilities in Higher Education' and the themes identified align well with the observations and findings of international and nation literature and serve as confirmation that similar forces are at play and that similar difficulties are experienced.

Themes identified in Literature Review

A number of themes have come to the fore in this literature review. It is in one or more of these areas that any gaps or opportunities to further the research will become evident. These will be discussed in the next section of this chapter.

Connectivity

The sudden forced move to online teaching and learning exposed weaknesses in some countries and socioeconomic groups and this excluded them from participation in fully online activities such as remote teaching and learning. 7% of third level institutes worldwide had to stop teaching altogether

as a consequence of their inability to move teaching activities online (Marinoni *et al.*, 2020). One study found that 45% of students had connectivity issues at times with 16% reporting issues very often (Means and Neisler, 2021). The INDEx survey conducted in Ireland in 2020 had as its top suggestion from students that they required better and more stable Internet connectivity (Cronin and McBride, 2020). The Union of Students of Ireland reported one third of their members had WiFi issues. They described a digital divide that exists in Ireland and a key recommendation of their report was that provision be made for students that lack access to devices or live in low connectivity areas. (Ireland, 2020).

Accessibility and the Digital Divide

A key recommendation of the Union of Students of Ireland's report was facilitating access for students from all backgrounds, including those with disabilities. The report makes specific mention of a digital divide in terms of accessibility to Internet (Ireland, 2020). Universal Design for Learning has been recommended and is in the process of being implemented across most of third level education including ATU Galway City, the organisation that contains the School of Science and Computing, which is the scope of this research (Ginty *et al.*, 2021).

Economically disadvantaged students

Of the 7% of third level institutions that were forced to stop all teaching activities when lockdowns forced learning to move online because they were ill equipped to do so, the majority were in third world countries (Marinoni *et al.*, 2020). Historically, it has been difficult to attract students from disadvantaged backgrounds to colleges and once there, retention was a problem (Higher Education Funding Council for England, 2001). With the adoption of blended delivery systems such students will experience additional difficulties due to a lack of access to devices and broadband as uptake of broadband is low in the areas from which these students come (Prieger and Hu, 2008). Examinations sat online put students with limited or poor connectivity at a disadvantage (OECD, 2020). Indeed, full participation in education for those of limited means requires a level playing field with similar access to equipment and broadband services as everyone else.

Blended Teaching and Learning

The nature of the subjects taught in the School of Science and Computing is such that a hybrid or blended teaching method is required (Ginty *et al.*, 2021). Subjects such as these require a certain amount of observation of students undertaking practical tasks that cannot be achieved in an entirely online environment (OECD, 2020).

Student Engagement and Satisfaction Levels

Lockdowns brought with them new challenges in terms of student engagement and new strategies were required (Ginty *et al.*, 2021). Resistance to adopting new technologies led to student disengagement in some cases (Deeley, 2018). Engagement with students when teaching online was a problem for 100% of teachers, even those with extensive experience doing so (Khan *et al.*, 2017). Student Engagement was a theme identified by the case studies based in CUA, which includes the very students and staff who fall within the scope of this research.

What next?

Current solutions offered by ATU Galway City's School of Science and Computing need to be evaluated and a determination made whether they are sufficient and if not, how they might be improved. This includes the area of user knowledge and training. Although the literature highlighted that emotional and mental health aspects are at play such as feelings of isolation and student engagement levels and difficulties with focus, this falls outside the scope of this research, which will limit itself to practical technical solutions or procedural changes in how remote computing services are provided, rather than addressing more nebulous aspects of non-technical areas such as best practice in delivering learning outcomes in a general sense or issues of wellbeing and mental health.

Based on the themes identified in the literature review, it seems clear that one area in which a gap might exist is that of addressing connectivity issues, with a focus on helping those students that come from an economically disadvantaged background. Surveys and interviews as well as observations can be used to confirm or deny this hypothesis and quantify the scope of the problem. Provision of connectivity to a group of test subjects can be used to validate any proposed solution. The next chapter will discuss the methodology used in both the research in general and data gathering in particular.

Chapter 3: Methodology

Introduction

This section shall describe and defend the research methodology and data collection approach used in this study. Since action research is not widely used in academia this section will begin with an explanation and justification of using action research before continuing on to the data collection approach. Finally, the specifics of how the chosen methods were employed will be outlined and explained.

Action Research Methodology

A research strategy, in the context of social research, can be taken to be the same thing as an 'approach' or 'methodology'. This should not be confused with data collection methods used as tools for data collection (Denscombe, 2017). Using that definition of research strategy, this research will be untaken using a strategy of action research. The data collection methods used in this research were semi-structured interviews, surveys and observation. This triangulation of data collection methods used within a strategy of action research will be defended and justified in this chapter.

Denscombe (2017) in describing how to choose a strategy suggests the researcher ask the following questions. Is it ethical? Is it feasible? Is it suitable? These are some of the questions that will be addressed in this section.

A key point added to the most recent sixth edition, absent in earlier editions of his book, is as follows. 'The researcher should choose a strategy that is likely to be successful in achieving the aims of the research, and be able to justify the choice of this strategy clearly and explicitly.' (Denscombe, 2017, p. 5). Action research fulfils these criteria for the specific research contained herein as this section will illustrate.

Action research is suitable for the task of solving problems that are practical in nature and arriving at a consensus as to what constitutes best practice (Denscombe, 2014). This is the type of problem that this research is investigating. If one is concerned with the interplay of humans, technology and information then action research is a powerful tool (McKay and Marshall, 2001).

Since this research is seeking to analyse offerings and improve outcomes in an educational context, action research is suitable as a strategy and is established as a preferred method by researchers in the field. The following quote serves to define action research and justify it as a choice for this research.

> Action research is any systematic inquiry conducted by teacher researchers, principals, school counselors, or other stakeholders in the teaching/learning environment to gather information about how their particular schools operate, how they teach, and how well their students learn. This Information is gathered with the goals of gaining insight, developing reflective practice, effecting positive changes in the school environment (and Educational practices in general), and improving student outcomes and the lives of those involved.
>
> (Mills, 2014, p. 8)

Action research can be used by both teachers and administrators to improve aspects of their organisation. The following quote shows an example of where a researcher in an academic setting picked action research as a strategy.

> 'For this purpose, action research strategy is considered useful for practitioners as it is practitioner based and also considers reflective practice as an essential way of reviewing and evaluating professional practices in order to improve school work.'
>
> (Lingam, 2012, p. 49).

Clearly, action research is suitable for the research. There are no ethical concerns that preclude action research as a strategy. The research can feasibly be completed within the time and resource restraints by using an action research strategy. Thus, action research was chosen as the strategy to be employed.

Quantitative and Qualitative Research

Robson and McCartan (2016) explain that there are two alternatives available to researchers in the Social Sciences, those of quantitative and qualitative research. Quantitative methods are the well-established means of measuring and recording. These are used in the natural sciences such as physics, chemistry, and biology. Put in the simplest terms, quantitative methods use numeric, non-contextual data. Qualitative methods use non-numeric, contextualised data. Objectivity is key in the first and subjectivity in the latter. However, many researchers believe that numbers and statistics are not well suited to the task of researching people in social settings. There is much debate between the two factions and the argument has been made that people and their problems, might be better analysed using qualitative methods. They conclude that at this stage there is a general agreement that a multi-strategy design that includes elements of both is best practice. This research encompasses elements that are both quantitative and qualitative in nature. A mix of both quantitative and qualitative data gathering methods will be employed.

Triangulation

It is beneficial to use a mixture of methods in research. This quote provides a definition.

> Triangulation is the use of more than one method in the study of the same thing. (In some professions, triangulation is known as "validation.") Triangulation is used (a) to get the best out of multiple methods and (b) to reduce exposure to the weaknesses of any one method. All methods are imperfect; each has advantages and disadvantages. By triangulating, we could maximize the advantages. For instance, by triangulating a case study with a survey, we would combine the depth of a case study with the generalizability of a survey.
>
> (Newsome, 2015, p. 406)

For this reason, the research will utilise multiple data collection methods which will be discussed later in this section.

Operationalization

Any ethnographic research will likely have a qualitative component yet Newsome (2015, p. 442) goes on to say 'The data produced by verifiable observations are known as empirical data as distinct from unverifiable data, such as subjective experience'. Empirical data is important. Others should be able to observe the same data if they use the same methods. The research must use where possible, quantitative data and not rely entirely on more subjective measurements.

Data Collection Methods

Interviews

Appropriateness for action research

When undertaking qualitative research, which can be part of action research, it is sometimes the case that useful data can be gathered by speaking to individuals in the setting in which the research is focused or who are the very subjects being studied. People can enjoy speaking about their areas of knowledge rather than filling in questionnaires (Gray, 2017). Interviews as a method for data collection can at times be informal (Tzortzopoulos *et al.*, 2020, p. 817) but formal interviews have their place (Bryman, 2016), especially when used in conjunction with observations, as one complements the other (Robson and McCartan, 2016). Robson and McCartan go on to describe the three types of interviews: fully structured, semi-structured and un-structured. In their introduction to the topic of interviews they say that interviews can be used as the main or sometimes only approach, especially

when a grounded theory design is being used. For this particular research, a semi-structured approach will be used.

Strengths and weaknesses

Interviews as a process are easily affected by respondent and interviewer behaviours (Harling *et al.*, 2018). Indeed, the importance of not framing questions in a way that suggests a particular answer is emphasised by Robson and McCartan (2016) and they discuss many of the pros and cons of interviews of different types. However, they have much that is good to say of the interview as a data gathering method. One can follow up on interesting lines of enquiry in an unstructured interview or modify a line of enquiry "on the fly". A rapport can be developed, and many participants enjoy talking about their field of interest whereas they might be reluctant to fill in a survey. Social and non-verbal cues can be important and there is the possibly of illiterate subjects requiring a "face to face" method that does not involve reading. They do however warn of several potential drawbacks and pitfalls of the interview. In particular, a lack of standardization, caused by the very flexibility of the unstructured interview, can be an issue. A high level of skill and experience is needed, and this can make the unstructured interview especially difficult for a beginner. As with any method of data gathering that involves a person, gaining co-operation can be difficult in some cases.

Practicalities of the implementation of interviews

Due to the Covid-19 Pandemic it was difficult if not impossible to have normal "face to face" interviews, and we must embrace a strategy that relies largely on remote access to our subjects (Howlett, 2021). These remote methods can often be viewed as a second choice to the gold standard of the tried and tested modes of conducting interviews and as an example, one limitation of using a Zoom or Teams call is the issue of a "head shot" as is standard in such calls. One cannot properly observe body language and other non-verbal cues in a Teams, Zoom or Skype call. However, these technologies have made it easier to engage with many participants in different settings and the reality in which we currently find ourselves is that we are obliged to use these remote technologies whether we like it or not. Yang (2021) used semi-structured interviews as a method when researching the learning experience of Irish university students when higher education was obliged to move online during the first lockdown in 2020. Bryman (2016) talks about how telephone interviews have some advantages such as relatively low cost and that the subject is less likely to be influenced by the social class, race, etc. of the interviewer. This is also largely true of any remote means of conducting an interview. Because the researcher plays such an important role in conducting an interview it is important to avoid falling into the trap of being unable to replicate the conditions using this particular method (Newsome, 2015). Interviews are especially useful in small scale research where there isn't a large budget and the researcher themselves are the main resource (Denscombe, 2017).

Observation

Appropriateness for action research

Robson and McCartan (2016, p. 80) tell us that a study that 'tries to answer questions about specific groups of people, or about specific aspects of the life of a particular group', can use observation as a method. They differentiate between the normal controlled observation that might be a part of any experiment in a laboratory and the direct observation by a human observer. Observation may be very structured or possibly unstructured (Mulhall, 2003). Observation may be undertaken in two ways, as a non-participant directly observing or as a participant, sometimes known as ethnography (Newsome, 2015). Certainly, it appears that observation is a data collection tool that is often utilised by action researchers when deemed suitable for the task at hand.

Strengths and weaknesses

There are a few things to consider when assessing the strengths and weaknesses of observation as a data collection method. First, we must remember that as in all statistical data analysis, correlation is not necessarily equal to causation. Observations may lead us to conclusions that are erroneous if we falsely assign patterns to the data. 'statistical patterns detected in observational data do not, on their own, provide evidence of causal relationships' (Murnane and Willett, 2010 , p. 204).

Mulcock (2004) speaks about the issues of impartiality.

> I could hardly separate my private life from my ethnographic work, given that I was part of the recent wave of Croatian migration to Australia. Introspection thus became an important part of my work, reflecting the apparent tension between the roles of the detached observer and engaged participant.
>
> (Mulcock, 2004, p. 83)

Easterby-Smith *et al.* (2015) discuss how observation best practice should be followed and address problems such as how to avoid ethical issues. Therefore, such concerns don't need to be a barrier to using observation as a method. Observation, they explain involves gaining the trust of the observed and becoming their friend. Sometimes one must trick the subjects or lie about one's true identity, which can cause some researchers difficulty. Covert observation is a double-edged sword. It gains the researcher a more accurate picture of the observed since they are unaffected by the knowledge that they are being scrutinised, yet this comes at an ethical and perhaps moral cost. Such ethical concerns don't apply to this research as such practices will not be employed. Dawson (2019) observes that although covert participant observation has been criticised, overt observation can be valuable and

rewarding. Yin R.K. (2011, p. 126) notes that, 'a major advantage of using site visits as a fieldwork procedure is the ability to collect data from many field settings as part of the same study'.

Practicalities of the implementation of observation

The primary decision one must make when using observation as a data collection tool is whether to be an impartial outsider observer or an active participant who is partially or fully immersed in the activity being observed (Gill and Johnson, 2002). Participant based observation runs the risk of the researcher losing their impartiality. This is offset by the advantages that come with first-hand observation such as not having to rely on the accounts of potentially untruthful subjects or those with an axe to grind or a bias of some sort. On the topic of covert versus overt observation, Gill and Johnson (2002) point out that people may well behave differently when under observation thus the argument can be made that covert observation is more scientific because of this fact. There are essentially fours ways one might undertake observation; complete participant, participant as observer, observer as participant or complete observer (Gold, 1958).
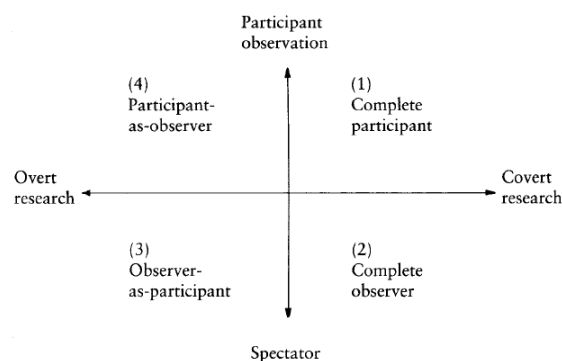
FIGURE 1 - A TAXONOMY OF FIELD ROLES

Gill and Johnson (2002, p. 149) use a chart to illustrate the different approaches to observation (See Figure 1). They also go on to point out that indirect observation also has its place. Clearly a mix of methods, as with all research, is often the best course and one must be mindful of the ethical concerns outlined earlier in all dealings with subjects of research.

Surveys

Appropriateness for social science research and action research

Although claims have been made that, traditional surveys are facing a 'coming crisis' because of the sheer amount of digital data now available about consumers and their habits and that such granular data may render the humble survey irrelevant, it appears that this crisis has failed to materialise and the survey as a data gathering tool remains useful (Hanquinet *et al.*, 2019). The high degree of

structure in the survey format makes them a strong data collection tool (Gill and Johnson, 2002). Surveys are listed as one of two 'strong traditions' in social research by (Robson and McCartan, 2016, p. 5). Surveys are usually based on a sample of the population but in rare cases use the whole population. An example of a survey that collects data from the entire population is a census. Bryman (2016) emphasises the point that a survey focuses on an individual and indeed pains should be taken to discourage the intrusion of others, so we know they are specific. Surveys have the advantage that they 'strongly emphasizes quantitative elements' and thus incorporate more than qualitative methods alone might do (Willis, 2015). Gray (2017) defends the use of questionnaires as follows.

> It is usually unwise to use a questionnaire in action research unless there are really good reasons for doing so. This is because they do not help to generate the forms of collaborative problem solving that action research requires. But the use of questionnaires is valid for discovering information that could not be ascertained in any other way, or for evaluating the effect of an action research intervention – again, if data cannot be gathered using other methods.
>
> (Gray, 2017, p. 385)

Although some might argue that surveys are more of a secondary than a primary data collection method, action research is a broad church, and surveys carried out by action researchers themselves, rather than the act of consulting previous survey results are clearly a valuable tool and deserve the status of a primary method in that context.

Strengths and weaknesses

There are four main benefits to using surveys as a data collection tool. They are, the collection of empirical data, the presence of both quantitative and qualitative data, wide coverage using either a large sample set or via sampling techniques and efficiencies of cost (Denscombe, 2014). However the way questions are worded can have an effect on the answers given and probe questions may be needed to give context to these answers (Willis, 2015). Denscombe (2014) gives three disadvantages of the survey, a tendancy to overlook theory in favour of the mere accumalation of data, a potential lack of depth and detail in the data collected and the fact that subjects can and often do ignore surveys and fail to engage with them. Robson and McCartan (2016) discuss the pros and cons of the survey and state the advantages of simplicity, adaptibility to generalization and high standardisation. In the area of disadvantages, they mention respondents can have faulty memory or motivation or experience that effects their answers, they might lie, low response rates can cause unrepresentative samples, there can be misunderstandings of the questions asked and the subjects may not take the survey seriously, a fact of which the researcher may be unaware.

Practicalities of the implementation of surveys

One of the biggest problems facing researchers conducting surveys is attrition. That is, the tendency of subjects to drop out and stop participating over long periods of time. 'Attrition is a problem in all studies' (Murnane and Willett, 2010, p. 69). Since a researcher cannot know what responses those who dropped out might have given it is possible that the effect of their absence is a reduction in how representative the sample is. 'The bias in findings resulting from the absence of data from those who do not respond is more important than non-response itself' (Robson and McCartan, 2016, p. 267). It is important therefore to keep the subjects engaged and involved as much as possible over the course of a study.

Sample size is another important consideration. The more comparisons between different groups i.e. males and females, different ages, etc, then the larger a sample size is needed (Bryman, 2016). He goes on to describe a technique known as snowballing. Snowballing is the practice of starting with a small representative group of subjects and getting them to recommend others with knowledge or experience in the area, who in turn recommend others and so on.

With Covid-19 mitigation currently ever present on our minds, there is certainly merit in using data collection methods that allow the use of the Internet rather than in person collection (Yang, 2021). The researcher should allow for possible weaknesses in the computer knowledge of the subjects and make life as simple as possible for them. For example Bryman (2016) suggests that using embedded questionnaires is easier and requires less expertise on the part of users than filling in and returning an attachment. The method this research uses is providing a link in an email to a Microsoft Forms survey. Staff and students in the School of Science are familiar with Microsoft Forms so there should not be any difficulties in using this data collecting tool.

Comparison of the three methods used

Observation, in particular participant observation, allows the researcher to see through others' eyes. 'The researcher's prolonged immersion in a social setting would seem to make him or her better equipped to see as others see' (Bryman, 2016, p. 494). This allows the uncovering of unexpected issues that would not have been included in a prearranged set of interview or survey questions. However Bryman (2016, p. 494) also notes 'It is likely that there is a wide range of issues that are simply not amenable to observation, so that asking people about them represents the only viable means of finding out about them within a qualitative research strategy'. It is pointed out by Newsome (2015, p. 423) that 'Participant observation is inherently more burdensome than nonparticipant observation, if only because of the time necessary to observe and participate'. The effectiveness of surveys is improved when cognitive interviews are used. This important methodology concern is described and

defined by Willis (2015, p. 16) 'the cognitive interview as practiced in the survey methods field is intended to evaluate, and to improve, self-report survey questions, measurement instruments, research consent forms, and other written materials'. I have already mentioned in an earlier part of this section that there are some data that can only be gathered via survey (Gray, 2017). However, it should be noted that 'Interviews have distinct advantages over questionnaires in that they provide richer data because you are able to probe further' (McNiff and Whitehead, 2009, p. 163). All the methods discussed run the risk of selection bias, 'the researcher might select certain respondents over others—thereby introducing a selection bias' (Newsome, 2015, p. 416). It seems that each method has its place and time where it is appropriate, and it really depends on the specific context, albeit these methods can, and often do complement each other.

Reflection

For a variety of reasons, a mix of methods is best practice. 'one way in which action research uses these methods differently, is that they are used in collaboration with others' (Gray, 2017, p. 385). Social science research and action research necessitates qualitative methods which may seem to break from orthodoxy but by using methods that complement each other, especially if some element of quantitative data gathering is included, then we can do good science that from an epistemology point of view has enough rigour and relevancy to be both practicable and useful. Ontologically speaking, although the nature of social science research and action research pull the researcher slightly towards the idealism rather than the realism school of thought there is enough grounded theory design surrounding these methods to make them excellent methods of data gathering when doing action research or social science research.

Description of how data collection methods were put into practice

Interviews were conducted with a number of individuals chosen partially at random, in order to get a representative sample and partially using a technique known as snowballing. This is where respondents recommend a person with greater or more specific knowledge than themselves and the researcher can build a better more relevant picture based on interviewing those individuals. An example of this is where the individual interviewed in the Staff Development area recommended speaking to the project manager of the Teaching and Learning Office. Student interview subjects were chosen from a variety of courses so as to allow for any difference between computing knowledge and ability. This difference would be a marked one as the school contains students of computing with a high knowledge and ability alongside those who study very different subjects such as marine and freshwater biology. The students interviewed were selected on the additional basis that they qualified for a loaned laptop which identified them as coming from an economically disadvantaged background.

These students were of particular interest as the literature review identified this group as being more adversely affected by the move to remote learning that others. The survey on the other hand cast its net wide. All students and all staff in the School of Science and Computing were included. This included not only lecturing staff but also administration and technical support staff. Open ended qualitative questions were analysed using thematic analysis methods where an inductive approach based on a semantic rather than a latent approach to the content yields emergent themes. See Appendix 4 Survey open ended question detail of colour coded data. Observations were made in the course of the researcher's work which is in the area being studied and pertains directly to it. It was important to allow for and avoid any bias resulting from being a participant in the area under observation (Mulcock, 2004). Much of the specific experiences of students and staff were unique to them and not a component of the researcher's work so remaining impartial was not difficult.

Summary

Action research was used as an overall research strategy with data collection methods of surveys, semi-structured interviews and observation. Interview subjects were chosen so as to be representative of the different levels of computing knowledge and ability among the very disparate groups in the school of science, which range from computing experts right down to those from non-computing fields with extremely limited computer knowledge. The students came from different years as well as areas of study. Some subjects were from outside Ireland and multiple genders were represented. The survey targeted the entire population and had a response rate of 340 out of the 1645 staff and students in the school. Observations were made and where necessary data was gathered from outside the school, such as from centrally provided services. There are no ethical concerns as the subjects who were recruited were not from any vulnerable groups nor were any of them underaged. Subjects signed consent forms and ethical approval was given for the research. Confidentiality was maintained for student subjects with labels used instead of names, such as subject X1. Some staff names are used as they are in the public domain already and there was no expectation of confidentiality in those specific cases. Specific personal data for student subjects is available to the supervisor and limited others such as external examiners but is not contained within this dissertation. Such data would be destroyed in keeping with GMIT's policies on GDPR after a period of time has passed. Data is stored on GMIT servers using OneDrive and Teams and Microsoft Forms with copies on an encrypted GMIT laptop device as a backup.

The next section shall deal with the specifics of these data collected using the various methods described above.

Chapter 4: Findings, Solutions and Discussion

Introduction

This chapter will detail the findings of the research, analyse the data collected and through discussion formulate potential solutions. First will be a description of the systems and resources that are in place, based on observations made by the researcher. Next, the survey data shall be discussed and analysed. This will be followed by the key findings from the survey. Finally, the interview data collected will be discussed and analysed and the key findings discussed. This chapter will finish with a recommended solution, the results of a validation test and a concluding summary.

Observations of solutions currently offered

Microsoft Teams

At the heart of GMIT's remote computing resource provision are some Microsoft products. Primarily, the Teams application tends to be the most commonly used method to deliver lectures to students in scenarios where the lecturer, the students, or both are not on-site. It can be the case that there is a mix of students attending a lecture, with some on-site and others remote. This can happen when practical on-site classes are occurring, but certain students cannot attend due to covid self-isolation or because they cannot attend in person for other reasons. Microsoft Teams is also widely used by staff when working remotely. Teams allows staff to communicate with each other in a variety of ways. It is integrated into the phone system such that calls made and received from and to ATU numbers can happen via a headset or the staff member's mobile phone. Wherever the person is, they can make and receive work calls via a device such as a desktop, laptop or mobile phone. Teams has a text messaging system as well. Direct messages can be made to staff and students as well as group chats within different teams. Teams have the ability to store files on SharePoint and collaborate on projects. There are some project management features such as assigning tasks and having checklists. The main use of Teams for remote work or learning is via its calendar and meeting features. In a similar manner to other products such as Zoom, video calls facilitate meetings of large groups. Screens are shared and interactions between teacher and student can occur.

Stream

Pre-recorded videos are hosted on the Stream platform. It can also be used to later view a lecturer or meeting that was recorded as it happened live. This is useful to those who might have missed the live event.

Outlook Mail

Email is widely used by both staff and students. Outlook mail, a subset of the Microsoft Office suite of programs is used with an Exchange mail server on the back end. Email is used to communicate one on one or via mailing lists to extended groups.

Remote Desktop

Microsoft Remote Desktop App allows a user to remotely connect to a physical computer on-site from anywhere in the world with an Internet connection. Due to security considerations only selected staff can use this facility and only on specific devices where permission is given. Typically, a staff member would use remote desktop to connect to the physical desktop computer in their on-site office. Remote Desktop also allows VDIs or Virtual Desktop Interfaces, to be used. These are virtualised computers sitting in the cloud that staff and students can access. Hyper-V is currently used to host the virtual computers but a move to VMware virtual machines is happening soon. The principle remains the same. The staff member or student can log on to a virtual desktop containing the software they require. Some individual applications are provided virtually without an overall desktop experience. An example of this is Agresso, the finance system used by GMIT.

Azure Active Directory and OneDrive

Staff are provided with a laptop device which is connected to the organisation's Azure Active Directory. This allows user authentication to happen without the need for local user accounts specific to the device. Files are saved to the cloud by using Microsoft OneDrive. This means that remote workers can access their files regardless of the device used to log in. Docking stations allow full sized keyboards, mice and a large monitor to be used. The laptop device is also brought on-site and used there as well. Separate docking stations are provided for on-site and home to avoid the need for carrying a docking station back and forth for hybrid workers.

Students also have access to OneDrive but are not provided with a laptop device except in exceptional circumstances. They are given the ability to install some software on their personal devices such as the Office suite of programs which includes OneDrive. Certain other specific software is licensed for student use. Examples are Minitab Statistical software and SPSS statistical software, ArcGIS and the Adobe suite of programs. Licenses are a mix of site wide such as SPSS and more specific named licenses which are only given to a select number of students, like Adobe multimedia products.

Ericom and LanSchool

Physical Computer laboratories can be accessed remotely using Ericom software. This client or web interface allows staff and students to connect to a computer in a laboratory and use it from their home as if they were physically in the lab. The mouse clicks and keyboard presses get passed to the on-site

computer and what appears on the on-site screen shows up on the home device. Any student enrolled on a science course can access the science computer labs using Ericom. Two factor authentication is required along with valid ATU credentials.

Staff and only staff, can access the lecturer's PC via Ericom. The lecturer's PC has some software called LanSchool running on it. LanSchool allows the lecturer to see a thumbnail of every computer in the lab so that they might keep an eye on what the students are working on. It is possible to take over a student's PC and demonstrate or correct work. Files can be shared with students if needed. This allows a computer laboratory practical class to happen with some or all the attendees off-site. This has the important advantage that all the software installed on computer laboratory devices is available to the remote users. It can be difficult or expensive for students to purchase all the software used in a course. Correctly configuring that software and having it perfectly match the setup in ATU can also be a challenge for many. Using Ericom to remote from home into computer laboratories solves these problems.

Codeio

Codeio is a system that allows lecturers to set up and provide interactive online cloud based lessons on specific programming languages and computing topics to their students. Quizzes interface with the existing Moodle system, also known as Learnonline, to automate the central gathering of results withing the institute.

Staff and Student Portals

Staff have access to a website that gives access to staff specific information such as Core Human Resources features and commonly asked questions about centralised printing, parking, covid policies and procedures as well as a host of other queries.

There is a specific website called the Student Portal with similar information for students.

Learnonline

The Moodle or Learnonline website is used in a variety of ways. Course details can be provided for each of the classes a student is taking. Assignments are uploaded via this website and quizzes can be taken. Often the safe Exam Browser or proctoring software is used in conjunction with the website to prevent dishonest behaviour. Course materials are distributed and assignments given.

Generic emails – ScienceIT , ScienceOffice, Learnonline, Registersation, etc

A number of generic email addresses are provided to staff and students so that it is not necessary to know a contact name in order to receive help. Examples are provided in the table below.

TABLE 1 - GENERIC EMAIL ADDRESSES EXAMPLES

Registration Problems or queries		studentreg@gmit.ie
Computer Problems (within Science)		ScienceIT@gmit.ie
Moodle queries		Learnonline@gmit.ie
Science Office Administrators		ScienceOffice@gmit.ie
Covid Officer		covidofficer@gmit.ie

Laptop Loan Scheme

There is a laptop loan scheme where students from economically disadvantaged backgrounds can avail of a laptop provided by ATU. This is intended to offset any disadvantage that might come from an inability to participate as a result of the lack of a suitable device.

The access office also provide laptops to students with disabilities that require specialised software or those with a disability that requires a device to enable them to participate in learning activities. Examples are those with dyslexia, vision or hearing impairment or dexterity issues.

Licensing issues

Some software was licensed in such a way that limited remote use. Only on-site use was permitted. Over the course of the pandemic lockdowns attitudes regarding remote use of software among venders softened and at this stage there are no such concerns.

Survey

The survey was sent in three phases. First a mail shot was sent to every science student by using the course codes mailing list names extracted from the banner system. According to the Office of the Registrar's Retention Report for 2020-2021 the number of science students who progressed into 2021 – 2022 was 1460. They can be broken down as 387 in first year, 412 in second year, 332 in third year and 329 in fourth year. Of those, 268 responded, giving a response rate of 18.3% of the population. Later a mail shot to the 24 technical support staff garnered 14 responses. This is a 58% response rate. Last the lecturers were sent the survey and of the 157 lecturers approached 58 responded. That is a 37% response rate. The four administrative staff were contacted individually and all four responded. For a graphical representation of the responses by type, see Figure 2. Overall 340 responses were received from 1645 for a response rate of 20.7%. This gives a margin of error of 4.74% for a confidence level of 95% for those data. See Appendix 1 Survey Questions to see what the survey looked like.
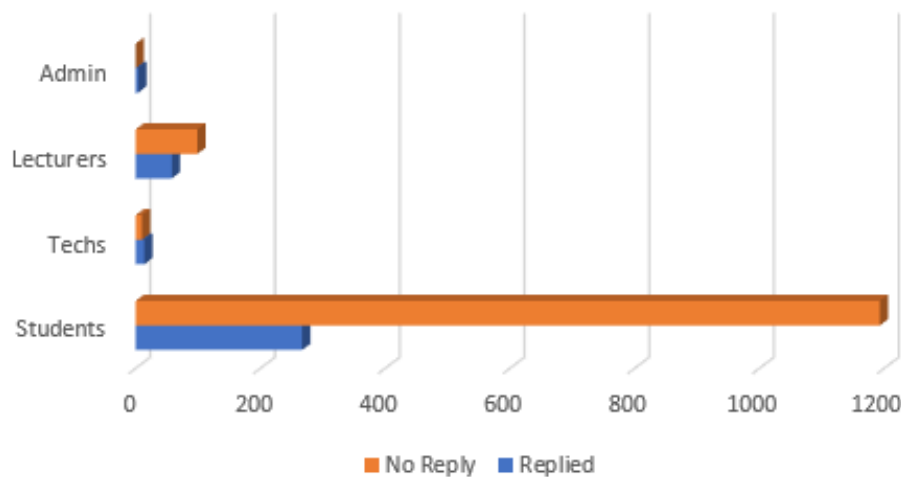

FIGURE 2 - NUMBER OF RESPONSES BY TYPE

The survey did not ask specific questions about gender or course codes or department. Those details were looked up retrospectively based on the automatically collected usernames. Gender was assumed based on first name and profile picture where available. Some foreign language responders, especially Asians, had a different name order to western European norms with their first name second. It was assumed that individuals would prefer a name associated with their gender identity and would present in their appearance as that gender. Since gender statistics were only used in a collective non identifiable manner there were no ethical concerns with collecting those data. The survey got

responses from students spread over 74 unique course codes out of the 123 course codes contacted. Each year of a course has a separate code so that represents roughly 18 subject areas of study.

In order to try and get as representative a sample as possible all science students and all staff were sent the survey. The gender balance was as follows in Figure 3 and Figure 4. As expected in STEM subjects, males outnumber females in students (Beede *et al.*, 2011). Similarly as expected for teaching and administration staff, females outnumber males (Sabbe and Aelterman, 2007).
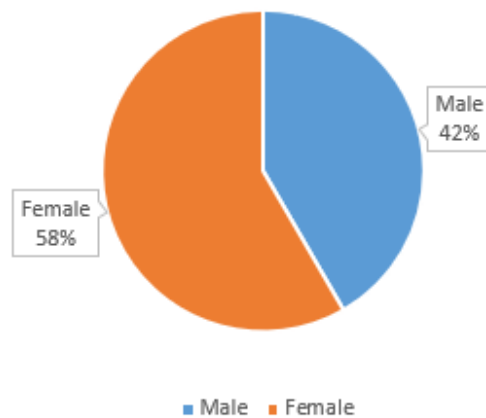

FIGURE 3 - STAFF GENDER BREAKDOWN
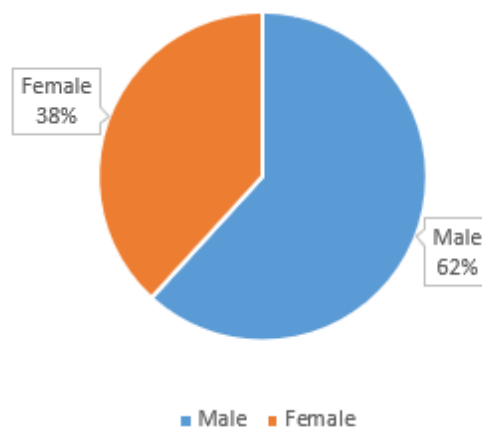
FIGURE 4 - STUDENT GENDER BREAKDOWN

The gender breakdown is consistent across all years of study as seen in Figure 5.
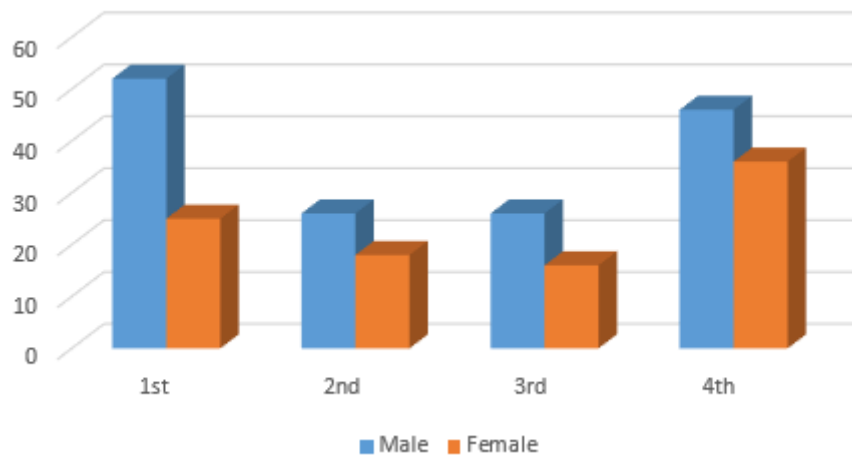
FIGURE 5 - GENDER BY YEAR OF STUDY

Some individuals were approached directly in order to improve the chances of getting responses from as many different departments and courses as possible. In particular it was important to make sure that non computing subject students and staff be represented as their knowledge levels and expectations and needs would be very different to computing people. The wide range of courses that responded, the responses across all years of study as seen in Figure 6 and the response rate suggests that a representative sample was taken.
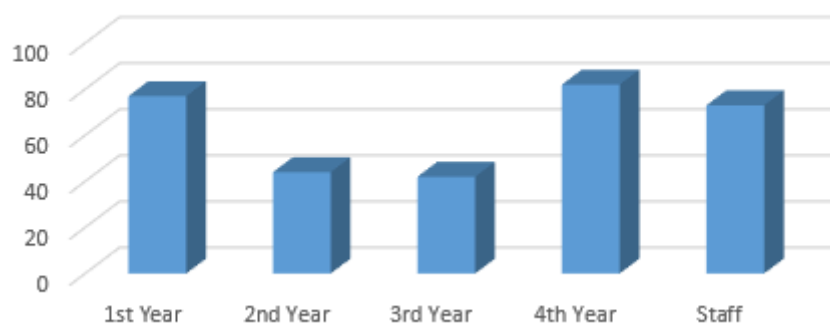
FIGURE 6 - RESPONSES BY TYPE / YEAR OF STUDY

Data from survey

Which of the following best describes you?

Question one on the survey identified the types of respondents as seen in Figure 7 below. The student responses came from 74 different course codes. Each code represents a year of study so first year would have a different code to second year and so on. Staff came from across all departments.
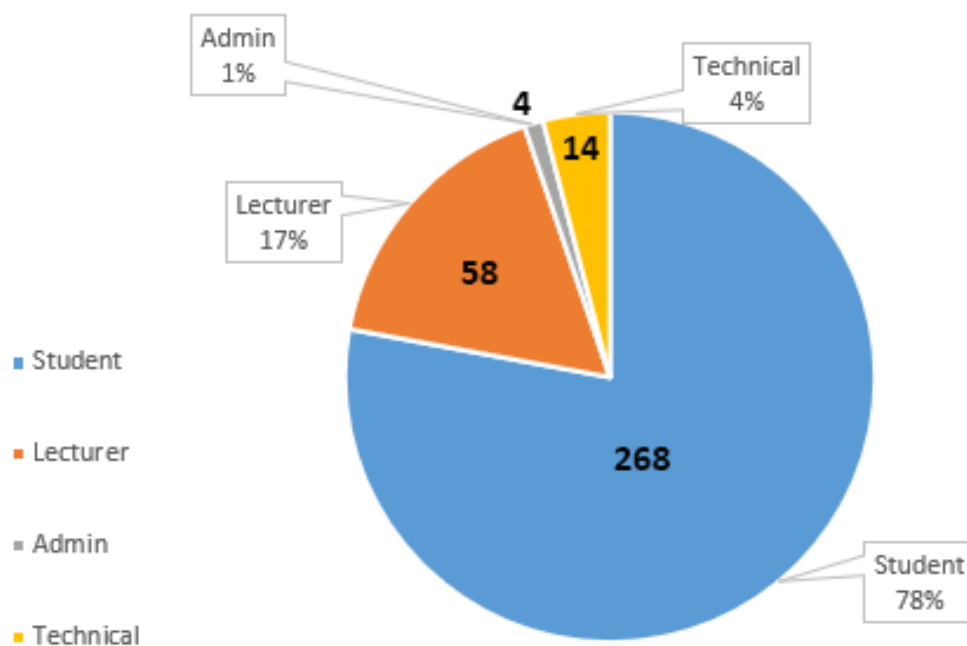
FIGURE 7 - TYPE OF RESPONDENT TO SURVEY

Was a device provided to you by GMIT?

Question two gathered information about whether a device was provided to the individual by GMIT. Typically all staff are provided with a device which is used both when working from home and also is used on-site. Staff are given a docking station and additional equipment such as a full-sized external keyboard and mouse, a 27 inch monitor and where appropriate a stylus pen for use with touch screen devices. Certain other equipment such as document cameras can be provided on a case by case basis to select staff.

Students would normally be expected to provide their own device for working from home. Computer laboratories containing desktop PCs with appropriate software for science courses are available on-site and can be accessed remotely using a variety of methods such as Ericom via the AccessPad client or Virtual Desktop Interfaces known as VDIs. Some students are provided with a loaned laptop if they

qualify for assistance through the student hardship fund. Approximately 400 students are currently using loaned laptop college wide with that number subject to an increase in the near future. 25 of the student survey respondents had borrowed laptops. The majority use a personal device as shown in Figure 8 below.
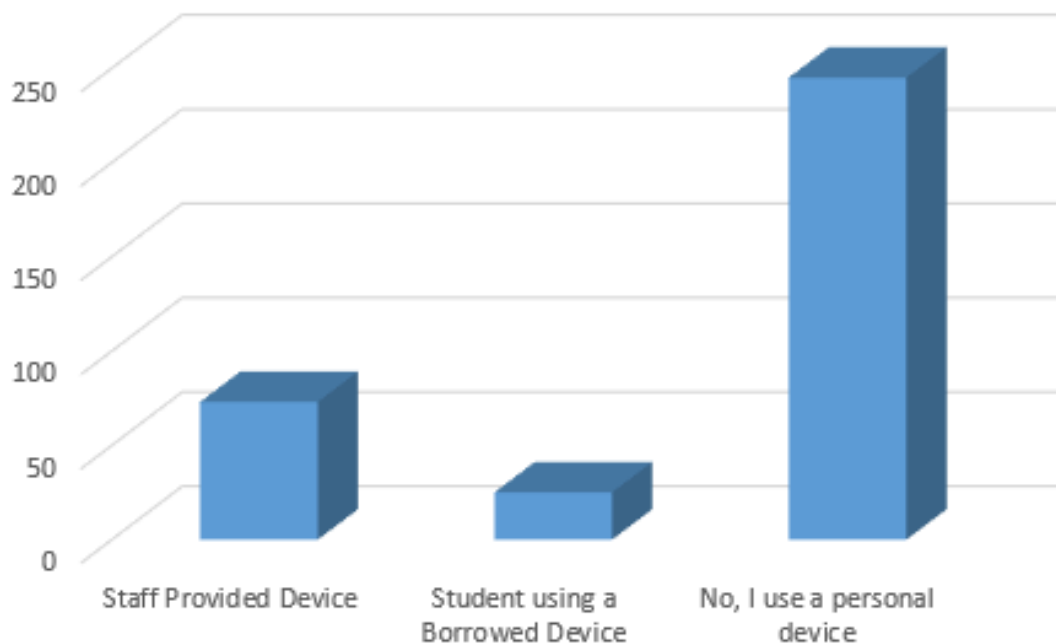
FIGURE 8 - TYPE OF DEVICE USED

How good is your Internet connection and speed at home?

This qualitative question addresses perceived quality of Internet connection at home. It doesn't specify specific bandwidths or upload and download speeds. It simply asks the respondent to rate the quality of their home Internet out of five. This simple review style rating is familiar to everyone and is useful to give context to other answers given in the survey. Overall responders seemed somewhat happy as seen in Figure 9 below.

340
Responses

★★★★⯪☆
3.54 Average Rating

FIGURE 9 - RATE YOUR INTERNET CONNECTION AND SPEED

These data are normally distributed as shown in Figure 10, with a skewness of -0.36.

Variable	Skewness	Kurtosis
Home Internet	-0.36	-0.30
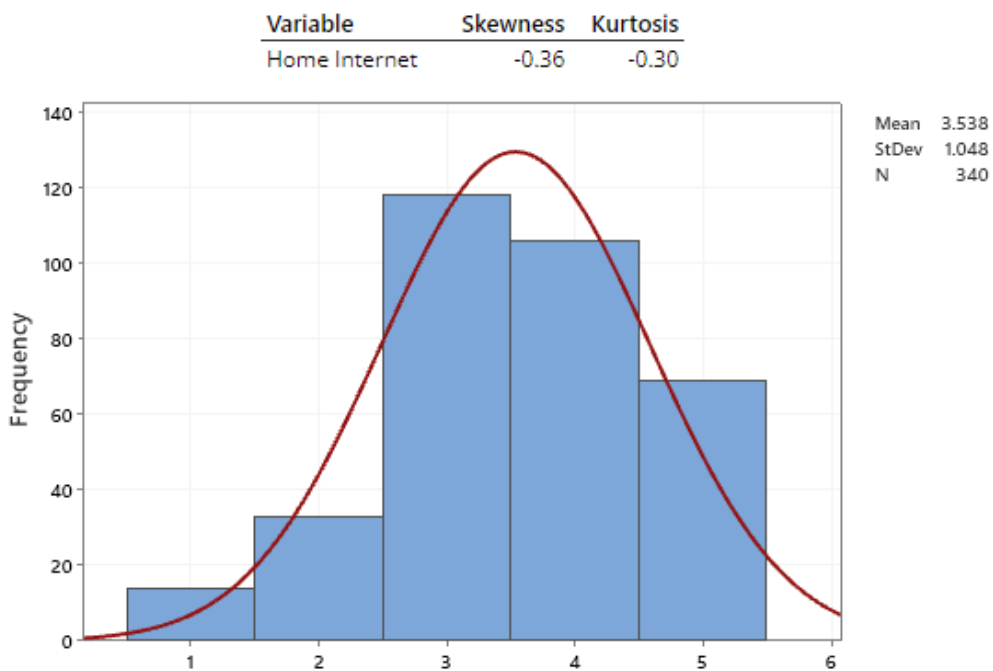
FIGURE 10 - HISTOGRAM OF RATE YOUR HOME INTERNET

When split in two groups, those with a borrowed laptop and those without there is a reduction in skewness in the borrowed laptop group suggesting that they have a reduced satisfaction level compared to everyone else as seen in Figure 11.

Variable	Group	Skewness	Kurtosis
Home Internet	1	-0.30	-0.01
	2	-0.37	-0.31
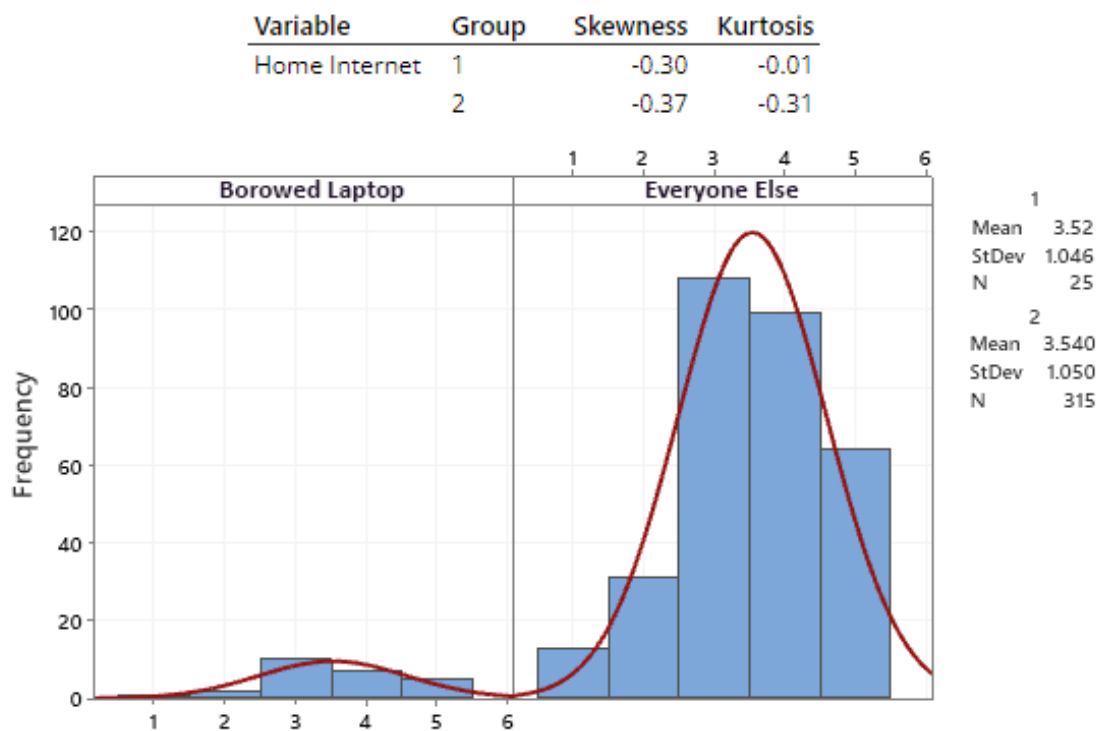
FIGURE 11 - HISTOGRAM OF RATE YOUR HOME INTERNET BY GROUP

Do you think the institute should provide you with WiFi / Internet?

This question addresses expectations about what should be provided by the institute in terms of the Internet connection rather than specific devices. It can be inferred that those who have no expectation of Internet provision by the institute are satisfied with their Internet connection and speeds and are comfortably able to finance a broadband connection. See Figure 12 below. The 195 who answered that it would be helpful to have WiFi / Internet provided must to one degree or another be having problems with the quality or their access to Internet. This might be due to limited availability of broadband services in rural areas or for financial reasons if certain students cannot afford to pay for broadband or mobile data.
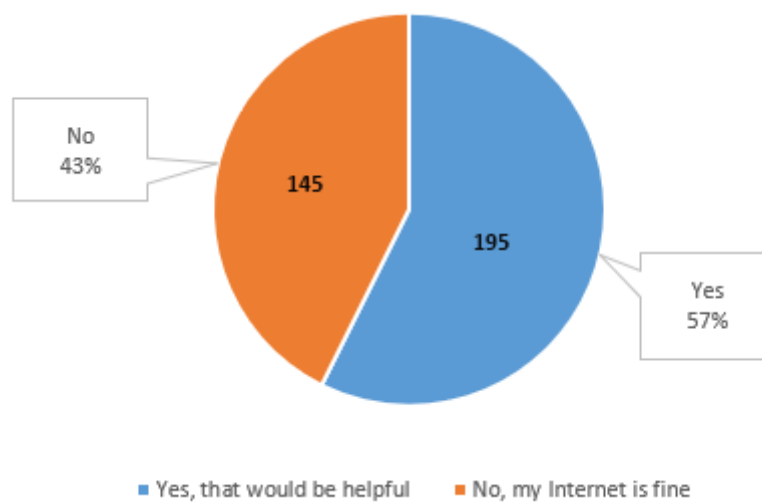
FIGURE 12 - SHOULD INTERNET BE PROVIDED?

If we break these data down by cross referencing whether the responder had a personal device or a loaned one an interesting pattern can be seen. The percentage who say Yes jumps to 75% for those with a loaned device, indicating a greater need for improved Internet among that specific cohort. See Figure 13.
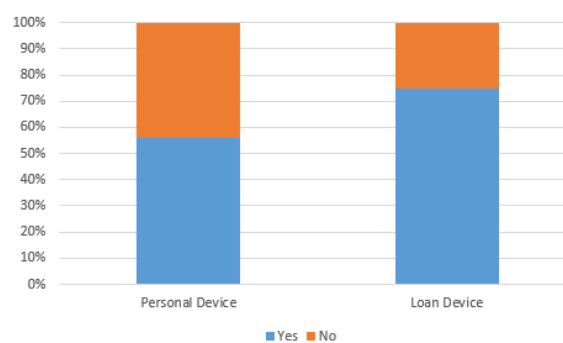
FIGURE 13 - SHOULD INTERNET BE PROVIDED BY TYPE OF DEVICE

Would you be interested in a free WiFi device to help with improving your home Internet?

This question was intended to identify those who might simply be saying yes to anything free that was offered, regardless of need or whether it added any value to their productivity. Conversely, responders who answer no to this question can be assumed to be highly satisfied with their Internet connection quality, accessibility and affordability. See Figure 14 below for the breakdown. When these responses are compared to the previous question, we can see that less responders were uninterested in a device to be provided than the number who answered that their Internet connection was fine. This suggests that at least some people with perfectly good Internet would still seek a device simply because it is free. We can have a high degree of confidence that the 80 who answered No have excellent Internet and that no value can be added to their situation in that regard by an intervention on the part of the technical university.
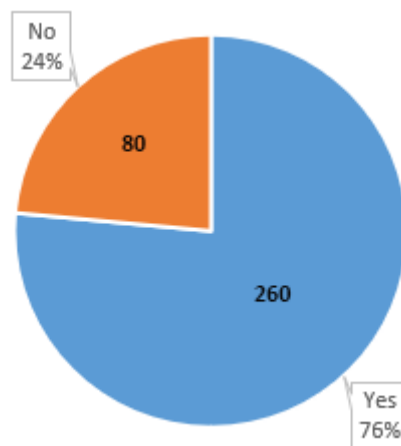
FIGURE 14 - INTEREST IN A FREE WIFI DEVICE

How good is your knowledge about how to work/learn from home? (Computer skills etc)

Question six was intended to gather data about training needs and knowledge gaps in the users. From the responses it appears that training needs are being met and knowledge levels of how to work and study from home are reasonably high. See Figure 15 below.

FIGURE 15 - RATE YOUR KNOWLEDGE

These data are moderately skewed with a skewness value of -0.59 when all respondents are included. See Figure 16. The trend towards satisfaction with knowledge levels is clear.
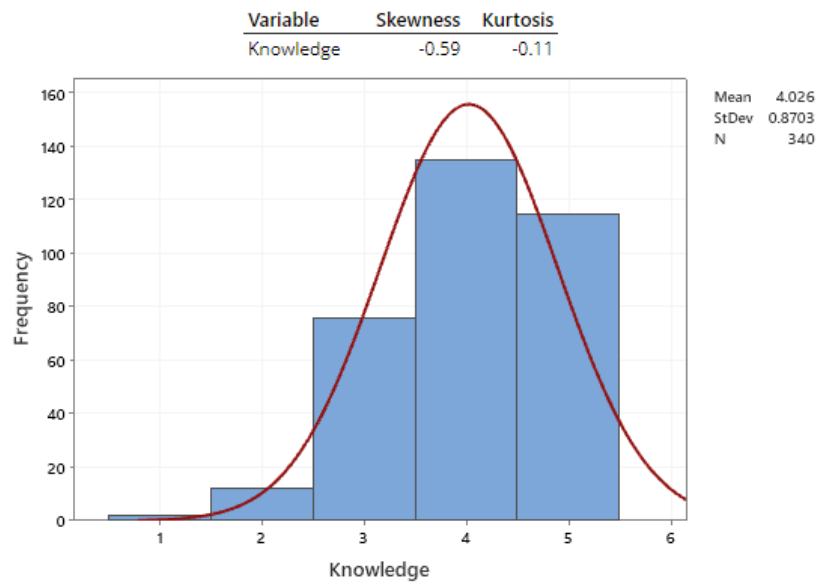
FIGURE 16 - RATE YOUR KNOWLEDGE HISTOGRAM

When the responses were split between those with a borrowed laptop and everyone else the skewness remains although it is much more pronounced in those with a borrowed laptop suggesting they have better levels of satisfaction with their knowledge than everyone else. Kurtosis was slightly positive for those with a borrowed laptop, as opposed to slightly negative for everyone else, but the difference is not statistically significant. See Figure 17.
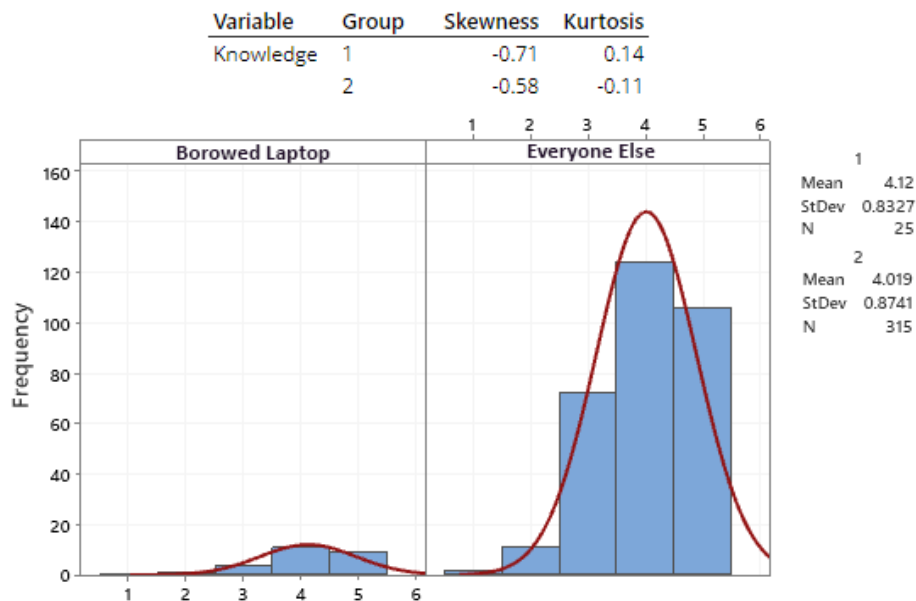
FIGURE 17 - RATE YOU KNOWLEDGE HISTOGRAM BY GROUP

How would you rate your ability to study/work from home? (Knowledge, Equipment, Internet)

Question seven of the survey asked for a more overall rating which incorporated not only knowledge but also equipment and Internet connection. From the lower rating than given in the previous question which focused entirely on knowledge levels it can be deduced that when issues are present, they are affecting those with sufficient knowledge and training. The issues appear to be elsewhere. See Figure 18 below.

340
Responses

★ ★ ★ ★ ☆
3.77 Average Rating

FIGURE 18 - ABILITY TO WORK/STUDY FROM HOME

These data are moderately skewed as can be seen in Figure 19. Overall there are far more responses saying they are having an average or better ability with few saying their experience is poor or very bad.

Variable	Skewness	Kurtosis
Ability	-0.59	-0.20

Mean 3.771
StDev 1.031
N 340
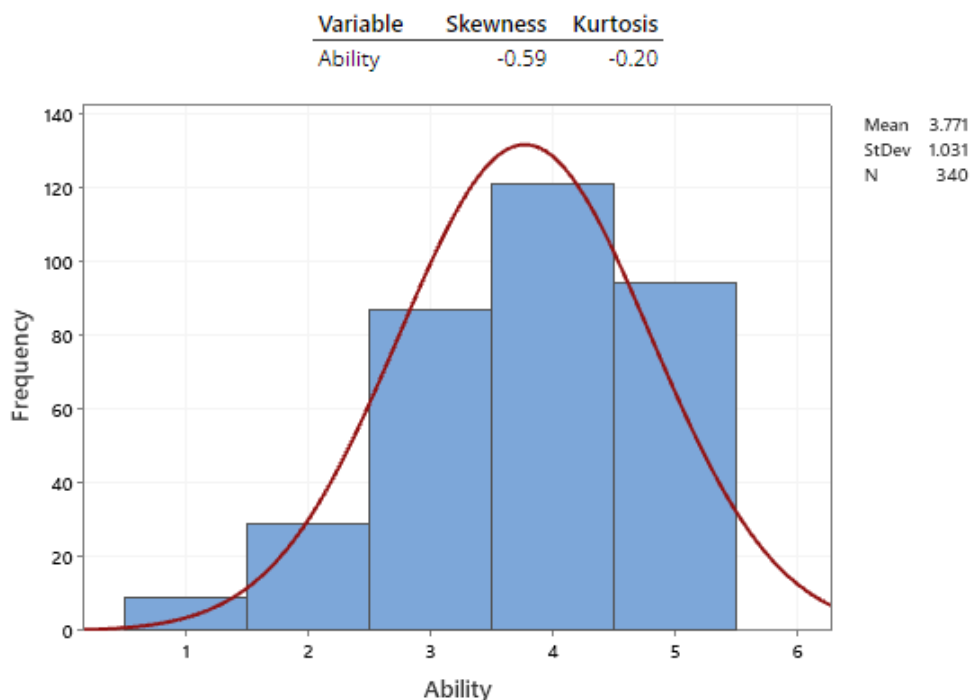
FIGURE 19 - RATE YOUR ABILITY TO STUDY/WORK FROM HOME HISTOGRAM

If these data are divided into two groups, with group 1 being those with a borrowed laptop and group 2 being everyone else something interesting happens. Those with a borrowed laptop show a normal distribution with skewness of only -0.16 whereas the everyone else group are showing a moderately skewed distribution with a skewness value of -0.62 indicating a longer tail on the left where the lower

ability answers fall. In other words, those who didn't need to borrow a device rated their ability to study and work from home higher than those with a borrowed device. The higher kurtosis value for those with a borrowed laptop indicated heavier tails on that histogram, meaning that the histogram was flatter with more data in the tails. This supports the hypothesis that those from an economically disadvantaged background are more likely to have difficulties than those without and that such difficulties are not in the area of training. See Figure 20.

Variable	Group	Skewness	Kurtosis
Ability	1	-0.16	-1.06
	2	-0.62	-0.12
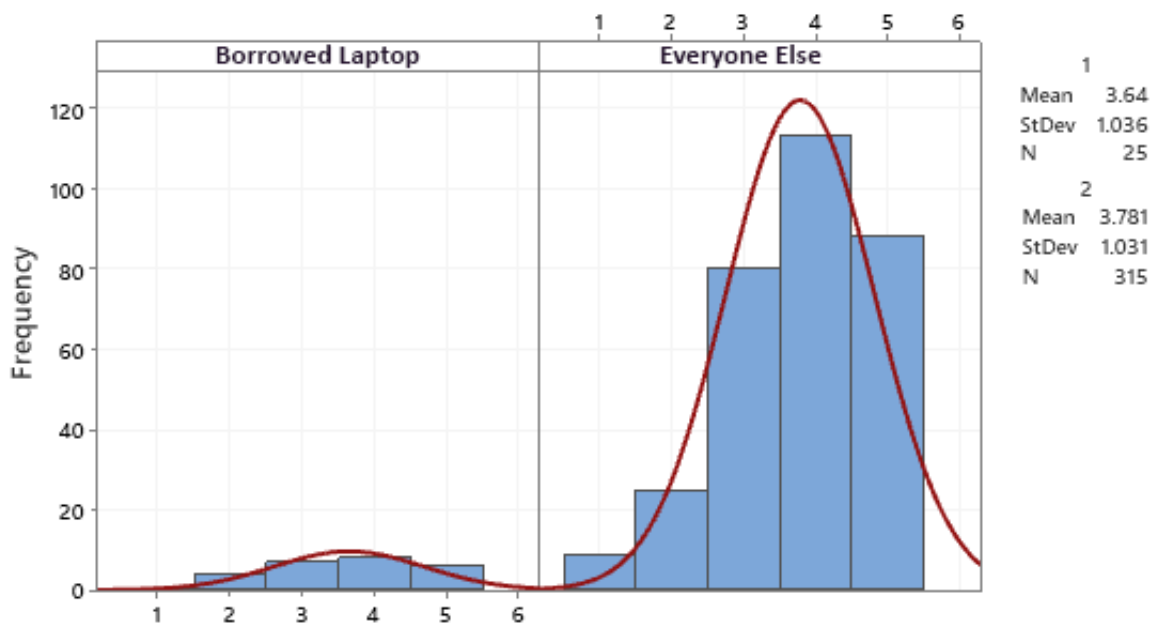
FIGURE 20 - RATE YOUR ABILITY TO STUDY/WORK FROM HOME HISTOGRAM BY GROUP

What caused you the biggest problems when remote studying/teaching/working?

This question asked the responders to rank three options in order of importance as regards what caused them the biggest problems when remote studying/teaching/working. The three options to be sorted were, Lack of Training, Bad Internet and Bad Computer.

The first choice of a majority was Bad Internet with the other two issues coming second and third. Bad Computer was chosen by the least people as their biggest problem as seen in Figure 21, suggesting that a majority of responders have a computer of sufficient power and speed. This might be explained

by the laptop loan scheme which allows students who would otherwise lack a good computer to have access to one.
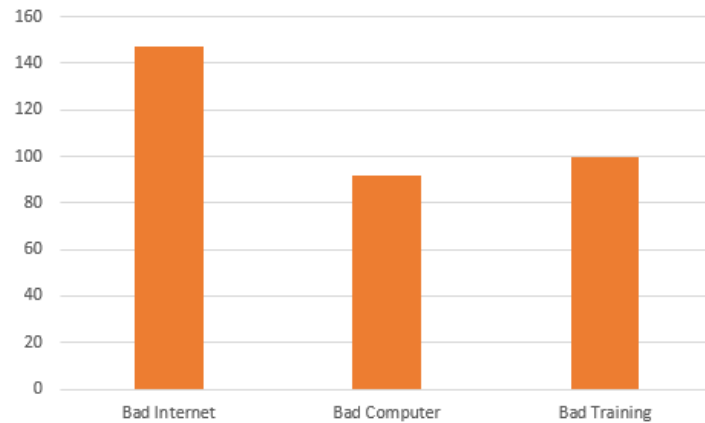
FIGURE 21 - BIGGEST PROBLEM 1ST CHOICE

Bad Internet is far and away the biggest 1st choice problem. If we look at what was ranked second choice, we see that the three options are almost equally spaced. See Figure 22. The difference between the three choices ranked second is statistically unimportant.
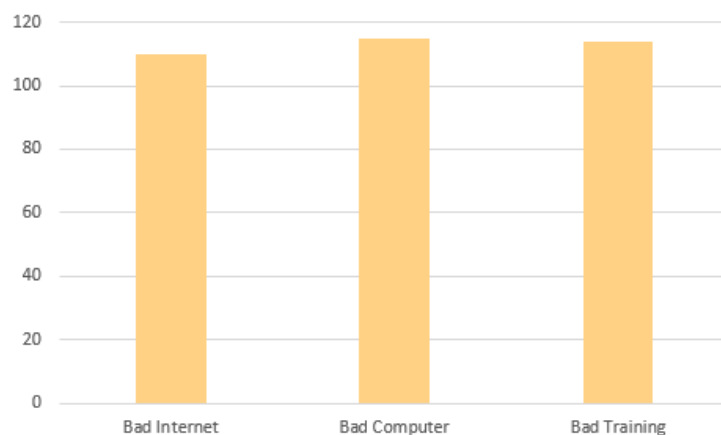
FIGURE 22 – BIGGEST PROBLEM 2ND CHOICE

Interestingly, the fewest people chose Bad Internet as their third and least important problem as seen in Figure 23. When this is taken with the highest number choosing Bad Internet as their biggest problem, the overall pattern of these data supports that bad Internet is where improvements could be made. Bad computer was the most common choice for third place as well as the least common first place choice and thus it can be inferred that responders do not consider their computer hardware as a priority issue causing problems. Bad Training is not far behind Bad Computer, confirming that Training is not standing out as a problem for people.
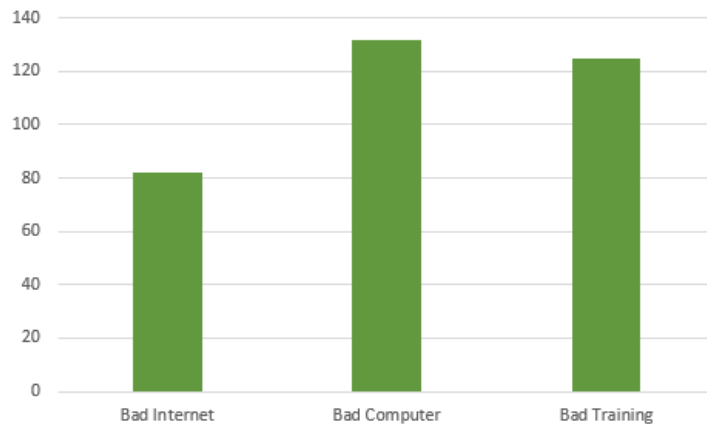
FIGURE 23 – BIGGEST PROBLEM 3ᴿᴰ CHOICE

Given the choice what option would you prefer going forwards?

Question nine was concerned with user preferences for working or studying fully on-site, fully at home or a hybrid work/study arrangement. The data shows a very clear preference for hybrid work/study arrangements with a fully on-site option preferred by the least amount of people. When we add the hybrid and fully working/studying from home options together there is a very clear appetite for remote computing from both staff and students. See Figure 24 below.
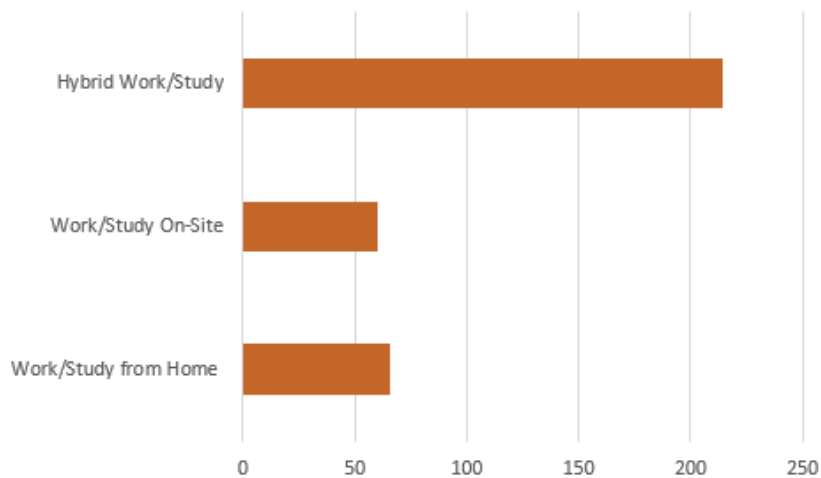
FIGURE 24 - PREFERENCE FOR ON-SITE OR HOME

In an overall sense these data show that the majority of responders have a sufficient quality of Internet availability and the knowledge and training to make use of same, to the extent that they show a preference for a fully remote or hybrid work or study arrangement. This strongly suggests that for most responders there are acceptable remote computing provision systems and solutions provided by ATU Galway City School of Science and Computing to staff and students and that any gap where improvements could be made would relate to a subset of responders only. The analysis of question

seven identified students with a loaned laptop as having a greater need for help with their Internet availability suggesting that subset of users need additional assistance from ATU Galway City School of Science. This finding is supported by the literature review.

What was your biggest problem working from home?

This final question was open form and allowed responders to type out a response rather than choose from a limited set of options provided for them by the researcher. Whereas the previous survey question gave responders a choice of three problems and asked them to rank those three in order, this open ended question allowed them to identify their biggest problems or respond that they did not have a problem at all. The open ended nature of this question yielded that the most common theme overall was bad Internet as can be seen in the word cloud in Figure 25 below. This is consistent with the other data collected during the research.

FIGURE 25 - WORD CLOUD OF RESPONSES

A thematic analysis using an inductive approach based on a semantic rather than a latent approach to the content resulted in the identification of a number of themes. The data were coded by means of colour highlighting in order to identify emergent themes. Yellow was used to highlight the theme of bad Internet or connectivity issues in general. A sample can be seen in Figure 26 showing the colour yellow was one of the most numerous ones. It had 100 occurrences. Difficulty focusing was the next most numerous at 75. See Appendix 4 Survey open ended question detail of colour coded data for full details.

"Internet. We have a big family and constantly go over our data allowance within 4-5 days of every month so I'm left with no internet and need to use my phone data, which is slow and not ideal to be working off my phone.

Not having an adequate work space was also a problem and lead to high levels of stress and lack of motivation "

Mostly Internet connection, and availability to required software like Adobe

WiFi

Self-discipline/scheduling

Bad internet connection

Internet

"Internet signal and getting a quiet area in the house to study at "

distractions

FIGURE 26 – EXAMPLE OF CODING OF QUALITATIVE DATA TO IDENTIFY THEMES

EMERGENT THEMES

The following themes were identified from the data.

BAD INTERNET

The single most common theme by a considerable margin was that of bad Internet. Bad Internet covers a variety of issues such as having connectivity issues due to being in a rural area with no broadband or poor coverage or speeds, the cost of broadband or just a generally unreliable connection. One student in Sport and Exercise Science, defined their biggest problem as follows. 'I live in a very rural area and the choice of broadband isn't great. Therefore the biggest issue was my internet connection … would be slow and wouldn't work at all.'

There were a large number of other examples of this as their biggest problem with most respondents using phrases such as, 'Unstable internet connection', 'Unreliable Internet', 'Internet Connection', 'Internet connection sometimes cut out'.

Internet speed was an issue for many. 'Network Speed was poor'. Another responder, a first year student from course code SFSCG_H08_Y1, explained that their biggest problem was, 'Internet connection slowing everything down'. Generally, Internet speed caused frustration but didn't prevent participation except in a minority of cases, for example this student with a loaned laptop who replied, 'The anxiety that surrounds whether or not it was going to work on a certain day didn't help nerves surrounding presentations or online exams … it would just disconnect and stop working half-way through a live presentation or oral exam for example'. One lecturer cited examples of losing Internet completely, 'This week, my internet connection has failed twice; a new 'development' which left me

and my class grounded'. Students were more likely to experience total Internet loss, '*I get booted out of lectures due to my WiFi'.* The frustration associated with Internet problems was evident in the answers given.

Finances were mentioned as a problem, 'If GMIT covered some of the cost*'.* Money problems were also given as the biggest problem by some others such as this response from an Asian student, 'Internet connection, electricity expensive'. Another example response from a third year student in SSESG_H08_Y3, mentioned ways that GMIT might help such as 'could be good to help students in many ways such as finance'.

POSITIVE EXPERIENCE OF REMOTE

Many responders reported that they had no major problems and that they had in fact had a positive experience working or studying remotely. A fourth year student in SPHNG_H08_Y4 replied, 'can't say I had any major problems'. Another student in their fourth year replied, 'it works perfectly for me'. In general there were many responses that indicated a preference for remote or hybrid working/studying going forwards, 'I hope hybrid learning can be the way forward' replied a student named Karl. Also, 'online college was great, and I personally prefer the online lectures' or as put by another student**, '**a mix of onsite and offsite could be good to help students in many ways'**.** Some suggested that hybrid delivery could benefit by allowing greater class sizes, 'it could increase the number of students you can onboard' replied a first year student in KCYGC_N09_Y1. Interestingly, there were only two responses that felt the opposite, that hybrid or remote learning or working was bad, 'Online learning is not my method of learning' explained a third year Spanish student and also a lecturer replied, 'Online does not replicate the human element'.

Personal circumstances made remote access a better option for some, for example, 'I believe continued availability of courses that are completely remote will be hugely beneficial, in particular to carers, stay at home moms and single parents'. Another responder preferred remote learning due to accommodation difficulties, 'I only have weekday accommodation which means I cannot be there on the weekends'. Conversely, those who shared an Internet connection in rented accommodation experienced slow speeds and their ability to work or learn suffered as a result, 'When we were all using the broadband at the same time it was very slow' explained one lecturer .

DIFFICULTIES WITH FOCUS

Second to bad Internet, the biggest problems responders had was difficulties focusing. The scope of the research concerned itself with technical and knowledge based issues, but emotional and psychological factors played a big part and must be acknowledged.

Many student responders repeated the phrase, **'**Lack of concentration', or, 'hard to concentrate', as their biggest problem. Lecturers seemed to broadly agree that student engagement suffered, with phrases such as, 'Not engaging in lecture's or 'getting the students to engage' a very common theme in the answers. 'I get distracted very often and it's hard to concentrate' or variations of same was the answer given by many.

EMOTIONAL DISTRESS

Emotional distress was evident in some of the answers, albeit in far fewer cases by some considerable margin than the top two issues of bad Internet and difficulties focusing. Fear of change, loneliness and worry cropped up in a number of responses.

Typical answers in this area related to worry were, 'I found myself worrying, stressful for everyone involved, high levels of stress'. Loneliness was evident as an issue in the following responses, 'Being isolated. Not having fellow student camaraderie in terms of advice, information, talk about things such as assignments, projects, giving out about everything anything (purge), being alone, loneliness' was the reply of a man in his fifties who is a mature student in fourth year.

A fear of change or difficulties adjusting to change contributed to the stress and emotional distress experienced by some responders. Some of the types of response that indicated this were this one from an administrator, 'Change - everything changed really quickly and several times Just as I was getting used to a new way of logging in or doing something, it changed again, mostly without notice, the amount of change and upheaval we went through'.

SCHEDULING DIFFICULTIES

Practical difficulties with classes being back to back or the physical need to move between home and campus were an issue for a similar small number of respondents. Sometimes this was as a result of timetabling and scheduling matters,

> 'With online learning too the lectures for some reason were scheduled back to back with no breaks, just because we were at home doesn't mean we didn't need a few mins of a break between lectures so that we could be wide awake and focused for the next, as was in college you'd always have that break of getting from one class to the next.'

Another responder said, 'Some classes were timetabled for four lectures back to back. Probably acceptable onsite but not online'.

Getting from home to an on-site practical class caused some problems, not only from the point of view of having time to commute but also having the ability to access online services while travelling, 'This

is difficult for me as there is very little internet on the methods of transport that I take. From cars, trains and busses'. Trains were needed by some, 'had to leave online class early to get a train, I travel from Wicklow to Galway'.

TRAINING

Training was mentioned in their replies by a very few. This suggests that training was satisfactory or at least that more training was not a priority or a desired solution to their problems for most. One responder did say*,* '*I* can just about get by with IT technology, am not trained or proficient and rely heavily on the IT support staff provided by the School'. One lecturer explained that, 'Delivering content while training myself was challenging'. Only one lecturer identified the Learnonline system as their biggest problem, 'Getting set up, accessing Moodle etc'. This is significant as that was an area where a lot of training was given as is described in other parts of this chapter.

OTHER ISSUES THAT WERE MENTIONED

Less frequent themes, to the point of being hardly mentioned at all were printing and "too much screen time". Only two responders, both of them lecturers, mentioned, 'not having access to a printer', as their biggest problem. Surprisingly, 'Looking at the computer all day was too long, or too many hours in front of a screen' was the biggest problem for only three responders out of 340. This was unexpected and might be explained by the current generation's constant use of screen based devices leading to a situation where they are so accustomed to heavy screen use that they failed to have an issue with that.

Discussion of Survey Data – Key Findings

Analysis of the data points to the fact that the effectiveness of remote computing resource provision by ATU Galway City's School of Science and Computing is satisfactory for the majority of users. Training needs seems to be met and knowledge levels adequate for the purpose. This is not surprising as the literature review showed evidence of sufficient importance being placed on training needs (Ginty *et al.*, 2021). Satisfaction levels overall are high suggesting that the remote computing provisions are generally fit for purpose. There appears to be a gap among the cohort of students with a loaned laptop in so far as there is evidence that those users are experiencing greater difficulty with their Internet availability and quality. This marries up well with the theme of accessibility and a Digital Divide that appeared in the literature review (Prieger and Hu, 2008) and (Ireland, 2020). It is further supported by the INDEx survey conducted in Ireland in 2020 which had as its top suggestion from students that they required better and more stable Internet connectivity (Cronin and McBride, 2020). This is an area where a mitigating action could be made by GMIT to improve the services provided in remote computing resource provision. The exact nature of what this mitigation ought to be, will be discussed

later in this chapter. Issues with difficulties focusing and emotional distress caused by isolation were also prominent but fall outside the scope of this research. This is an area where further research by others would be beneficial.

Interviews

Interviews were conducted with two distinct groups. Those were staff involved with the provision of training courses and also students from economically disadvantaged backgrounds. The interviews were semi-structured with a framework of questions used as a basis from which to start and a means of ensuring certain key points were addressed. Interviewees were allowed to go off on tangents or introduce topics of their own as well. See Appendix 2 Interview Question topics/prompts for semi structured interviews for specifics.

Training and user knowledge

The staff development office have responsibility for staff training and development. Sanchia Morris, a project manager in the area of training and staff development was chosen as a person with direct experience of staff training provisions. She recommended Jessica Duffy, a project leader in the Teaching and Learning Office as another person with relevant knowledge and experience in this area. As in other sections, direct quotes are highlighted in bold italics.

Emergent Themes

The themes identified from these interviews were all very positive with almost no problems identified at all in this area. This is supported by observations and survey data as described elsewhere in this chapter. The single difficulty mentioned in the area of training was related to trying to find a level of complexity and detail that suited everyone from such a diverse population, 'One challenge was people with different levels of skills/abilities'. Literally, every other answer or observation was good.

TRAINING NEEDS WERE MET / POSITIVE FEEDBACK FROM STAFF

Staff feedback to those providing training was entirely positive. All the feedback was good with Sanchia Morris from staff development saying, 'People seem to be very satisfied with the training we provided and also All the feedback was good'. Jessica Duffey from the Teaching and Learning Office reported that, 'Everyone seems pretty happy with training'.

A larger number of courses were provided over the period of time during which the institute was working remotely but that was not necessarily as a result of the online nature of the course provision, 'Many new staff were hired over that period. Additional training would have been needed anyway'. The most popular courses were described as, 'There was a high demand for Excel, PowerPoint, etc. Always sold out' and also 'Mental Health Awareness, Mindfulness, etc was popular'. The other data gathered elsewhere showed that those working or learning remotely were experiencing emotional difficulties connected to feelings of isolation and difficulties with focus thus the high demand and uptake of mental health and mindfulness courses would appear to be a successful attempt to address

this by the training providers within the organisation. The Teaching and Learning office experienced a high demand for courses in, 'Nitro Pro and Banner' in particular in addition to the standard Office applications. The courses offered were tailored to the specific needs of teaching staff, 'BOLT worked with us to tailor courses to the needs of lecturers'. Staff development found that popular courses also included 'Teams, Sharepoint, OneDrive' which are all directly useful in remote working and learning and have already been mentioned in the observation section data. A full list of courses provided can be seen in Appendix 3 Teaching and Learning Office Courses provided (last 18 months).

GOOD ATTENDANCE / ALWAYS SOLD OUT

Sanchia Morris from the staff development office explained that they had a high number of requests for training and uptake was high on all courses, 'Overall course requests and uptake was high'. When questioned about the comparison between recent years and the past when courses were given in person rather than via remote, she answered 'Attendance was very good online, better than on-site historical levels'.

ENGAGEMENT

A pattern that emerged was that there was, 'more engagement if you didn't record the sessions' but that this was, a balancing act. 'For information sessions cameras off was better, for training where breakout groups etc were used then cameras on was better'. People preferred not to be on camera and could be somewhat uncomfortable with being recorded but, 'those who missed the sessions wanted recordings to access' so there were conflicting needs and wants at play.

Students from economically disadvantaged backgrounds

Seven individuals were identified as belonging to a particular group of interest as they were in possession of a loaned laptop provided by ATU Galway City. When the pandemic began, GMIT, as it was named then, began a scheme where laptops were provided for students who were unable to afford one. This was to offset any disadvantage such students might suffer when teaching went online due to lockdowns. Qualifying for a loaned laptop identified them as coming from an economically disadvantaged background. Phase one of the loan scheme gave out 400 laptop devices and subsequent phases has been approved due to identified increased needs. A number of loan laptops are also provided via the Access Office for students with disabilities such as dyslexia or impaired vision or hearing loss. A significant number of students would depend on loaned laptops when all these are added up. The subjects interviewed came from a variety of School of Science courses, both computing based and also non-computing. This was to allow for the different needs and abilities of students with different specialisations. In particular, computing students would have different abilities, knowledge and requirements than general science students. There was a mix of genders and two of the subjects

were born outside Ireland. The seven subjects were therefore deemed representative of the greater population.

Emergent Themes

The following themes were identified from the data. Direct quotes are indicated by the use of bold italics. There was broad overlap with the themes identified from the survey data questions.

BAD INTERNET

All those interviewed described their Internet as bad. This aligns well with the other data gathered from the open ended question in the survey which identified bad Internet as the biggest problem. For example, when asked a specific question during the interview about their Internet connection the replies were as follows. One subject described their connection as, 'Absolutely terrible', and another subject answered, 'The internet connection I use can be unpredictable. It sometimes works perfectly, and other times won't even connect. It disconnects for no reason'. Another explained, 'I use 4g and hotspot when it gets bad'. When using Internet in multiple locations the quality can vary, 'Bad at home , good in my rented accommodation', was the experience of one interview subject.

Most subjects needed to tether their laptop to a mobile device in order to get around limitations with their broadband connection, 'I tend to use my own hotspot from my phone for important meetings to reduce the risk'. This put a financial burden on them all, with a different subject explaining, 'As I have to use my hotspot from time to time, it does result in a heavier monthly bill for my own personal internet'. Another similar reply expressing concern about this was, 'I must pay for monthly data and regular internet'.

Even when answering questions about other areas, these problems associated with unreliable Internet kept being mentioned. The biggest problem regarding remote study was identified by one as, 'My internet connection'. When discussing whether they had equality of opportunity with everyone else, one respondent said, 'the connection to my house is poor' as a part of an answer which mentioned the area in which they lived and the choices available to them. In reply to a question about offering suggestions on how to improve their experience one replied, 'being able to loan out an internet connection of some sort or receive funding to upgrade my connection would be a beneficial idea for individuals such as myself'.

DIFFICULTIES WITH FOCUS

Difficulties with focus was an identified theme in the data gathered from the open ended survey question about what the biggest problem was, for those working or studying from home. Once again it appears as a theme when these interview data were analysed. 'Finding the motivation to not get

distracted', was a problem for the interviewees. Another found it, 'hard to motivate myself to work'. Yet another found that, 'concentration levels declined massively'. It was, 'hard to learn practical things online' for one of the students questioned. The literature review also identified focus and concentration as well as student engagement when teaching and learning online, as an issue (Rovai and Barnum, 2007).

Such difficulties do not fall within the scope of this action research as its aims and objectives were limited to producing technical, or procedural changes, or to make recommendations, rather than to address content delivery and absorption of information by students from a purely teaching point of view. However it cannot be ignored that this difficulty with focus is an issue that many struggled with, and this is something that could be addressed by others undertaking further research in this area.

EMOTIONAL DISTRESS

Emotional distress also figured as a theme in the survey data, much as the difficulties with focus appeared in both data collection methods. That finding is therefore also verified via triangulation of methods as it was identified as a theme in these interview data as well.

Such distress was not always directly or solely due to remote work or study as in the case of one young woman who explained, 'I was dealing with a still raw bereavement'. Another subject identified themselves as, 'a former foster child' in an attempt to give context to their state of mind. It is impossible to separate such emotional factors from the complex interplay of overall context and specific circumstances but one can fairly state that at the very least emotional distress was compounded by other stresses such as the isolation of lockdowns and the remote learning experience, if not made significantly more difficult.

'Anxiety when completing exams or in lectures' was mentioned in one answer but it is important to point out that this anxiety was as a direct result of worries about 'The internet connection I use can be unpredictable'. Thus we can say with confidence that an improved Internet experience would reduce that anxiety and that specific problem could be addressed via this action research. Isolation was a problem for many, with one person saying, 'I personally struggled' and they also specified, 'I found it hard not being a part of the social circle anymore. I felt slightly isolated'.

FINANCES

As would be expected, finances are a concern for this cohort of students. By definition they are at a disadvantage when it comes to services where additional payment is required. When asked whether the cost of Internet was a factor for them the replies were consistently in the affirmative. 'It most definitely is a factor for me', said one subject. Another answered, 'Yes, as I must pay for monthly data',

and a simple 'Yes' was the response from others. Some complained about the cost of paying for accommodation, 'can't attend all classes and with price of Galway accommodation it is hard to get a place'. Only one interview subject replied in the negative to that question, with a rather simple and to the point reply of, 'Not really'. That particular individual had Internet coverage problems, 'we are not close enough to the mast for most broadband suppliers' so it is clear that money wouldn't solve that problem. Coverage may improve in such areas as a result of the new services coming on stream in the near future that are satellite based such as Starlink, assuming that the student in question can afford them (SpaceX, 2022).

POSITIVE EXPERIENCE OF REMOTE

When asked whether having the facility to borrow a laptop from the college was helpful to them the answers were 100% positive*.'* It made a huge difference to me because my course was computing and having a device is critical in my course for learning and doing assignments', replied one student. Another replied that, 'The laptop is major help' and yet another replied that it made, 'A massive difference'. The huge difference answer was echoed by a different student using very similar language, 'It made a huge difference to my college life' and went on to say, 'The laptop loan scheme allowed me to use a much faster and up to date laptop to do my assignments'. No one contradicted this positive attitude towards the benefits of a loaned device. All were very thankful and most gave the impression that they would not have been able to complete their studies without such a scheme. It is logical that more support of this nature, such as the provision of free broadband Internet would only increase the benefits and level the playing field for those from economically disadvantaged backgrounds who experience the ill effects of the digital divide mentioned in the literature (Prieger and Hu, 2008). Retention issues traditionally associated with this cohort would also be mitigated (Yorke and Thomas, 2003).

SCHEDULING DIFFICULTIES

As with the open ended survey question, interview subjects talked about issues surrounding timetabling and scheduling. One student wanted the option to take a poll of students to determine the most suitable times and 'build a timetable around those allocated times'. This answer was given in the context of a desire for a hybrid delivery of the course to avoid difficulties with the price of accommodation, 'it is hard to get a place for a decent price'. Having on-site exams caused a problem for those who needed to travel a large distance in time for an exam, 'The problem with remote learning was coming all the way for exams as the distance is quite long'. This same scheduling problem had also appeared in the survey responses.

The students interviewed all had a loaned laptop provided by GMIT. Due to security concerns they do not have administrator rights on those devices. This means that they cannot install applications or make configuration changes and must contact technical support to undertake those tasks for them. This caused frustration for several of the subjects with comments such as, 'The laptop is major help as I can bring it around campus and do work for college on it but the only problem is downloading apps due to the admin request'. Another student said, 'With the firewall it was very time consuming to download all the software I needed on the device and throughout the year I would always have to contact a technician'. In response to a question about specific difficulties experienced another subject mentioned as a difficulty, 'the fact that most things have to be done through permission (which I completely understand)'. That subject was not alone in having that issue, with another explaining, 'a good few apps that are needed for the module are blocked or I am just unable to download them due to admin request'. Unfortunately there is no way to safely give the general population of users administrator rights on their devices. Staff and students run the risk of accidentally installing malware or other unwanted software such as viruses or spyware due to a lack of expertise and experience in computer technology and the institute is obliged to insist that installations and configuration changes be untaken by the technical support staff. This is a part of the institute's cybersecurity policies and follows best practice advice for the industry. This is not an area where the institute can accommodate the requests for a relaxation of rules as recent ransomware attacks on the other university and the hospital in Galway city prove.

Discussion of Interviews – Key Findings

The themes identified correspond well with the emergent themes from the open ended survey data and many of the same issues affected the subjects. The students interviewed all had problems with their Internet connection and there was a pattern of using a mobile hotspot to get around these problems. The cost of Internet in general and mobile data in particular is considered a disproportionate burden on themselves according to this group compared to those with more financial security and means. There is a desire for help in this area. Similar problems with concentration and focus which tie in to reduced student engagement and learning outcomes were evident in these data and this supports the survey data findings. There was an appetite for more remote or hybrid delivery of courses, suggesting much as the survey data did, that remote computing provision is of a good standard overall. None of the interview subjects complained about training needs which aligns well with the overall data collected in the research. Training needs appear to be met with high satisfaction levels from attendee feedback and very positive information coming from those involved in the delivery of training.

Suggested Solution and Validation

These data across all gathering methods show that a gap exists in the accessibility of Internet to those students who come from an economically disadvantaged background. If the burden created by the cost of an Internet connection was removed, in a similar manner to the very successful laptop loan scheme, this digital divide would be addressed and parity of opportunity to learn and participate in remote access to computing resources would be the result.

Internet data could be provided in a number of ways but the simplest means of testing whether a gift of data would be beneficial was to purchase a pay as you go type sim card and give it to test subjects. Seven subjects, chosen from those with a loaned laptop, agreed to participate in the research. There was some attrition as the research progressed and by the time validation of the gifting or provision of data was required, only four of the original seven were still actively participating as willing subjects. Two of these subjects, identified in this document as X1 and X3 use the Vodafone network with subjects X2 and X5 on the Three network. There was a mix of student types in these four subjects with two studying a computing subject, one studying Sport and Exercise Science and the fourth student studying Freshwater and Marine Science. One month of unlimited data was purchased and given to the four subjects allowing them to tether their devices to their mobile phones and avail of a stable Internet connection via 4G mobile data. This gift of mobile data meant that they didn't have to share an Internet connection with others in their rented accommodation and also, they could use the mobile data as a backup system for when the broadband connection failed or was too slow for whatever reason. These were all scenarios the subjects identified as problems they experienced when trying to use remote computing resources provided by ATU Galway City School of Science and Computing. Ideally, a 5G connection would be provided for the higher speeds that system provides but the 4G connection was sufficient to test the concept.

The results of the validation test confirmed that the solution of gifting Internet data to students from disadvantaged economic backgrounds had a large positive impact.

Subject X1, a 4th year computing student, said that 'this would be beneficial to students', and also' I got use out of the SIM card, so I know others would too'. As regards the value of such a scheme as the norm, she replied, 'I think it's a really good idea for people struggling with money and paying bills'. She also stated when asked for any comments, 'I think it's a great idea and would help many students out'.

Subject X2, a 2nd year computing student, replied that 'it was very useful' when questioned about how having the free data affected him. When asked if he would be in favour of such a scheme happening

on an ongoing basis he responded, 'yes It would be great'. When offered the opportunity to make any comments of his own at the end of the interview he stated, 'it was very helpful and I am grateful for the opportunity'.

Subject X3, a Freshwater and Marine Biology Year 3 student, thought that, 'The free data made such a difference. It really helped me out'. On the question of whether the scheme would be worth rolling out she replied, 'Yeah definitely, I think it would be especially useful for people from disadvantaged backgrounds'.

Subject X5, A Sport and Exercise Science Year 4 student, remarked 'it was useful to me as I use mobile data for a lot of my assignments. I would find it beneficial to have regular top ups'. She would have preferred not to need to swap the sim card each time. Her mobile device lacked the feature of two sim card slots available in most devices, so she had to open up the phone and swap the cards each time. 'The only issue I found with it is I had to keep swapping SIM cards into my phone and using my hotspot that way but it was worth it to have the data!'

Concluding Summary

These data suggest that remote computing resource provision for the majority of users is largely effective and accessible. Training needs are being met with high levels of satisfaction across the board. A special case are students from economically disadvantaged backgrounds who appear to be at a disadvantage in terms of accessibility to Internet in a general sense as they can struggle to afford a reliable broadband connection. Such students already benefit greatly from a laptop loan scheme and a similar scheme to gift them Internet would be beneficial and would address this problem of the digital divide, as identified not only in the data gathered in this research but also in the literature review. Testing of this solution resulted in very positive feedback from the four subjects taken from a representative spread of courses and years of study.

Chapter 5: Conclusions and Recommendations

Introduction

The question posed by this research was "What are the most efficient strategies to improve the remote working and learning experience in ATU Galway School of Science and Computing?" I have answered this question and realised the aim and objectives of the research. The aim was to analyse the effectiveness of remote computing resource provision by ATU Galway City School of Science and Computing. Such analysis has shown that the systems in place are good, user feedback shows high levels of satisfaction and stakeholder knowledge and training levels are excellent. The objectives were to identify what is being done well and also to identify any gaps or weaknesses and thus be in a position to put systems or procedures into place to improve the provision of remote computing resources, fill any identified gaps and address any weaknesses identified by recommending mitigating actions. A gap involving students from economically disadvantaged backgrounds was identified, and a solution was proposed and tested. Testing validated that solution.

Limitations and Strengths

The scope and focus of the aim and objectives of the research were technical and procedural in nature. As such, any resulting recommendations or actions would be addressing those types of problems. However, when gathering data about issues or difficulties experienced, the subjects naturally did not limit themselves to technical matters and emotional difficulties such as feelings of isolation during lockdowns, and in particular, difficulties with maintaining focus and issues surrounding student engagement during remote teaching and learning were identified as the second most important factor, with the biggest issues faced being in the area of their home Internet connection. A limitation of this research is that the scope and focus left those other non-technical concerns largely unanswered. The limited time available allowed for only one iteration of testing to validate the proposed solution. Multiple iterations would have been better and made for better scientific rigour.

A strength of this research was the range of individuals from diverse backgrounds that were studied. The ATU Galway City School of Science offers a wide range of courses, with some of these courses highly technical and attracting those with an affinity for and familiarity with computer technology. Yet it is also true that other courses fall on the opposite side of the spectrum. These courses are in fields which would traditionally interest non-technical people such as marine biologists or sports scientists. In this day and age, all disciplines require some use of technology but as evidenced in the literature review there can be resistance to the adoption of new technology and methods (Deeley, 2018) (Snart, 2010). This diversity of subjects studied and the number, made for a very representative sample. The

results gathered confirmed the findings of previous work done in this field, validating that the previous findings also applied to this population of workers, teachers and learners. This is a contribution to the literature and will be helpful to others doing research into this area.

Context

The context in which the research was undertaken was that of a Covid-19 pandemic which necessitated global lockdowns and forced a move online for working, teaching and learning activities that had to happen quickly (Gadusova *et al.*, 2021). This afforded researchers a once in a lifetime opportunity to study large populations interacting with systems and practices that were historically only used by a minority (Hall *et al.*, 2021). That large body of research informed and gave direction to this research which adds to and compliments other work done in this field by delving into a more specific area, that of the provision of remote computing services and solutions which enable such remote working, teaching and learning to happen. The haste with which the move online needed to be put into place limited the potential effectiveness of the solutions put in place (Forum, 2020) so it follows logically that it is worthwhile and valuable to analyse these solutions and identify what worked well and where improvements or additions might be made. This research gave real actionable practical insights to ATU. Recruitment and retention of both staff and students depends on high quality remote working and learning facilities (Sheather and Slattery, 2021). This fact is confirmed by these data gathered in this research with high levels of interest in either remote learning and working or hybrid arrangements. Hybrid was by far the most popular choice of both staff and students, with fully on-site the least popular. This preference strongly suggests that remote computing provision was of a good standard for the majority of stakeholders.

Key Findings and Conclusions

One of the aims of the research was to establish what was being done well. One example of this was the area of training. Training needs were met according to the data collected and satisfaction levels were high in terms of training and knowledge levels. There was as would be expected, a high demand for courses related to remote teaching and working, such as workshops in specific applications like Teams or the use of cloud storage via OneDrive. The usual suspects of Office applications, Word, Powerpoint and Excel were naturally in high demand. Courses were always sold out quickly. Attendance was higher on these remote training courses than historical on-site levels. Another new development during the lockdown period was an interest in courses that helped with mental health such as Mindfullness and Well Being workshops. Feelings of isolation and difficulty focusing were a theme in the literature and also figured in the data gathered in this research. The demand for these workshops was an attempt to address that problem by the staff. Students wouldn't have had access

to those nor the time to attend them on top of their already full timetables. Students identified scheduling as an issue at times due to difficulties with hybrid learning requiring them to move between home or rented accommodation and on-site campus practical classes or exams. Back to back classes for three or four hours created difficulties for some remote learners. Without the natural break of moving from one classroom to another the multiple back to back classes were more tiring. This was related to students attending ordinary lectures rather than staff training which was overwhelmingly positive in its outcomes and user feedback. The only issue identified in the area of training was the difficulty of allowing for different levels of ability in trainees. From all this it can be concluded that from a training point of view, the systems and solutions in place were effective and fit for purpose.

In general terms those surveyed or interviewed appeared satisfied with their remote working, teaching or learning experience. The only exception was a frustration on the part of staff with an ATU device and students in possession of a loaned laptop with their inability to perform administrator level tasks such as installing or configuring software. This limitation is in place to protect the university's computer systems from external attacks, such as ransomware or viruses and for all the problems it causes, it avoids much more serious and damaging ones. Despite this one frustration, a desire to either work, teach or learn entirely via remote or on a hybrid basis was held by the majority of subjects with very few wanting a fully on-site experience going forward. This aligns well with the literature which highlights a post lockdown phenomenon known as the 'great resignation' where workers are leaving their jobs in large numbers and taking up new work (Sheather and Slattery, 2021) (Allman, 2021). This change is driven by a desire for hybrid or remote working conditions. A similar desire to learn via a remote or hybrid delivery system exists in the student body. Therefore it is important that ATU caters to this need, or it risks retention and enrolment issues of both staff and students in the future. This craving for a continuation of the remote working, teaching and learning experience is a vindication of the systems and services in place and is reassuring evidence that they are fit for purpose.

The biggest problem that subjects experienced, by a considerable margin, was that of bad Internet. This manifested itself as either slow Internet speeds or limited availability of broadband in rural areas. This must be taken in the context of an overall good satisfaction level. A sizeable portion of subjects experienced little to no problems in this regard but those who did have these issues were badly affected. Slow speeds were as a result of shared Internet connections struggling to accommodate a house full of users, or because students from economically disadvantaged backgrounds had difficulty affording a good connection or unlimited data. Such issues were also present in the literature (Prieger and Hu, 2008). Both the literature and the data pointed to a digital divide. That is to say that the remote experience of those without the means to access high quality Internet was markedly different to those who could. There were a number of other factors that led to individuals having difficulty

accessing decent quality broadband such as remote rural areas with poor coverage but by far the most common reasons were financial. Given the means to purchase Internet most users could find a service even if they lived in the remotest of areas (SpaceX, 2022). Absent the ability to pay, some students experienced the wrong side of the digital divide and suffered accordingly. The laptop loan scheme has been very successful in assisting students from economically disadvantaged backgrounds. It stands to reason that this cohort would benefit greatly from financial assistance of a similar nature with respect to their Internet connection. The best laptop in the world is of little use if it isn't able to connect to the Internet. Retention of students from this cohort of economically disadvantaged students is an issue that was identified in the literature (Yorke and Thomas, 2003). A potential solution of gifting bundles of all you can eat data to this cohort was tested over a period of a month. Validation returned very positive results for the test subjects and confirmed that the gifting of data was a solution to their problem and redresses the imbalance, giving them equal access to a good educational experience. This is an area where ATU can do something new in its provision of remote computing services and solutions to make a real difference to people's lives.

Although the scope and focus of the objectives of this research did not include the resolution of mental health and emotional factors, such issues were on the minds of the subjects. After problems with bad Internet, the next biggest issue was difficulty focusing. Feeling of isolation and difficulty getting the students to engage also featured in these data. This mirrors the literature closely (Deeley, 2018) (Khan *et al.*, 2017). The ATU Galway City, Teaching and Learning Office found that student engagement improved when the cameras were switched off. This suggests that being recorded may have made some students self-conscious and less likely to engage. However cameras on was preferred by those lecturers who wanted to feel a connection with their students (Conklin and Dikkers, 2021).

These key findings address the research question asked and answer it, giving a practical actionable solution to an identified problem. In terms of aims and objectives of this research, they identify what was done well and where a gap existed. A mitigating action was identified.

Lessons Learned

If I were to do this research again, knowing what I know now I would do some things differently. One example is the validation of my proposed solution. I purchased sim cards with pre-paid unlimited data for a month and distributed these to four test subjects. This allowed me to purchase physical objects and distribute them to the test subjects. It might have been easier for the subjects if I had simply paid for additional data on their existing phone numbers, avoiding any physical component, as they wouldn't need to insert a second sim card into their phones and switch between sims in order to create the hotspot. I also should have collected information about how much data the subjects used

normally before running out and how much extra was used once unlimited data was made available. The testing could have been done earlier in the academic year, when the students were less busy and multiple iterations over several months was possible.

Recommendations

In order to address the digital divide and give parity of educational experience to students from economically disadvantaged backgrounds, ATU should establish a scheme where data bundles can be subsidised or gifted entirely to those who qualify via means tests. Due to cybersecurity concerns, it is not advisable to grant administrator rights to standard users and thus the established practice of requiring a member of the technical support staff to authorise such activities should continue, despite the frustration it causes to some. It is recommended that the mental health and mindfulness courses be extended so that they are made available to students as well as to staff. Student engagement could be improved by lecturers by more actively encouraging higher use of cameras being switched on where appropriate and where the students are comfortable doing so. Otherwise, the remote computing systems and solutions provided by Galway City School of Science and Computing to staff and students appear to be at a good standard and fit for purpose. Further research work could be done by others in the area of difficulties with focus and student engagement, which was not addressed within the scope of the objectives of this research.

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Appendices

1 Survey Questions

Remote Teaching and Learning Survey

1. Which of the following best describes you
   *

   ☐ Student

   ☐ Lecturer

   ☐ Admin

   ☐ Technical Suppport

2. Was a device provided for you by GMIT?
   *

   ☐ Yes, I am a staff member who received a device

   ☐ Yes, I am a student with a borrowed device

   ☐ No, I use only my personal devices

3. How good is your Internet connection and speed at home?
   *

   ☆ ☆ ☆ ☆ ☆

4. Do you think the institute should provide you with WiFi / Internet?
   *

   ○ Yes, that would be helpful

   ○ No, my Internet is fine

5. Would you be interested in a free WiFi device to help with improving your home Internet?
   *

   ○ Yes

   ○ No

6. How good is your knowledge about how to work/learn from home? (Computer skills etc)
   *

☆ ☆ ☆ ☆ ☆

7. How would you rate your ability to study/work from home? (Knowledge, Equipment, Internet)
   *

☆ ☆ ☆ ☆ ☆

8. What caused you the biggest problems when remote studying/teaching/working? *

Bad computer (Low specification)

Bad Internet (Slow, poor signal strength)

Lack of training

9. Given the choice, which option would you prefer going forwards?
   *

○ Work/Study from home full time

○ Work/Study on-site full time

○ Hybrid work/study , some remote , some on-site

10. What was your biggest problem when working/studying from home?

Enter your answer

2 Interview Question topics/prompts for semi structured interviews

These were prompts to remind myself that certain topics were covered to bolster the free form informal open ended side of the interviews with some structure.

Students with a loaned laptop interviews

As a student with a loaned laptop, how much of a difference did it make to you to have that facility?

Do you tend to do your work from the same place or from a number of places i.e. rented accommodation and sometimes at home?

How good or bad is the Internet connection that you typically use?

Is the cost of Internet a factor for you?

Do you think that you have the equality of opportunity with everyone else or do you believe you are at a disadvantage? If so, can you explain?

What in your opinion, is the biggest problem, if any, that you have regarding remote study?

Do you have difficulties with installing software on the loaned device?

Do you have any suggestions about how to improve the loan facilities? Perhaps related to the procedure surrounding application or the specific of what is available.

Overall, how would you rate the online experience during lockdowns?

Any comments or questions of your own?

Training Interviews with Sanchia Morris and Jessica Duffy

Did you notice a trend for requests for extra training during covid lockdowns?

Would you say staff uptake of courses was high or low?

Does it ever happen that staff complain about needing training but when it is provided, they say they don't have time to attend?

What was the most popular training course?

Least popular?

Where do you see the gaps in knowledge?

Was there a difference between pre-covid and covid times?

Any comments?

3 Teaching and Learning Office Courses provided (last 18 months)

Academic Integrity Hub in GMIT

Ally - Accessible Content Is Better Content

Alternative Assessment Strategies for Online & Blended Learning (Level 1, 2 & 3)

An Insight into the iNOTE Digital Teaching & Learning Programme

Articulate Training

Assess your Quiz and Question Bank: Use Moodle analytics to examine how your Quizzes and Questions performed this year.

Assessment Planning - Guidelines for assessment planning for an online module this semester

Assessment Tools on Moodle (Level 1 & 2)

Building Creative Teaching and Learning Resources with H5P in Moodle

Co-Designing Solutions to Online Teaching Challenges

Creating Video for Blended & Online Learning (Level 2 & 3)

Digital Badges in GMIT: what works, why and how?

Digital Ink: Using OneNote as a whiteboard for online learning (Level 1)

Digital Teaching & Learning Orientation for New GMIT Staff

Digital Teaching & Learning Q&A Clinic (Level 1, 2 & 3)

Digital Teaching & Learning Q&A Session â€" Using MS Teams Effectively for Teaching Online (Level 1, 2 & 3)

DigitalEd Discovery Webinar Series: Creating Video for Blended & Online Learning

"DigitalEd Discovery Webinar Series: DALTAI Project: Learning Analytics Webinar"

DigitalEd Discovery Webinar Series: Digital Teaching & Learning Topics and Resources

DigitalEd Discovery Webinar Series: Gamify or Not to Gamify

DigitalEd Discovery Webinar Series: Getting Up & Running with Digital Open Badges (Session 2)

"DigitalEd Discovery Webinar Series: Getting Up & Running with Digital Open Badges (Session 1)"

DigitalEd Discovery Webinar Series: Intro to DigitalEd.ie

DigitalEd Discovery Webinar Series: Intro to TEL for Blended Learning

DigitalEd Discovery Webinar Series: Introduction to DigitalEd.ie

"DigitalEd Discovery Webinar Series: Introduction to Technology Enhanced Learning Tools for Blended Learning"

DigitalEd Discovery Webinar Series: Learning & Curriculum Design for Online & Blended Delivery

DigitalEd Discovery Webinar Series: Microsoft Digital Discovery Day

DigitalEd Discovery Webinar Series: Online Learning from an Industry Perspective

DigitalEd Discovery Webinar Series: Online, Interactive & Hands-on Teaching of Software Development

"DigitalEd Discovery Webinar Series: Teaching Online is Different: Perspectives from the #Openteach Project"

DigitalEd Discovery Webinar Series: The Online Learning Employability Toolkit

DigitalEd Discovery Webinar Series: UDL: Making Difference in Higher Education

DigitalEd Discovery Webinar Series: Using MS Teams for Delivering an Online Class

DigitalEd Discovery Webinar Series: Visual Pedagogies for Online Learning

"DigitalEd Discovery Webinar Series: Welcome, Introduction to DigitalEd.ie & Online Teaching & Learning Keynote

Speakers"

DigitalEd Discovery Webinar Series: What the H5P? ! Creating Rich & Interactive Module Material

DigitalEd Information Sessions, GMIT Galway

DigitalEd Information Sessions, GMIT Letterfrack

DigitalEd Information Sessions, GMIT Mayo

DigitalEd Information Sessions, IT Sligo

DigitalEd Information Sessions, LYIT Killybegs

DigitalEd Information Sessions, LYIT Letterkenny

DigitalEd Week: Assessment & Student Engagement in Online Teaching

DigitalEd Week: GMIT Student Supports Showcase

DigitalEd Week: H5P - Create Engaging and Interactive Learning Objects

DigitalEd Week: Intro to Design Thinking - An Interactive Workshop

DigitalEd Week: Keynote Dr Catherine Cronin + Panel Discussion, Online Careers Module & Academic Programme Showcases

DigitalEd Week: Keynote Sheila MacNeill, Academic Writing, Student Engagement & Performance in Online Delivery & Digital Blitz

DigitalEd Week: Microsoft Education Development Day

DigitalEd Week: NEW Online Courses in GMIT-Design Showcase

DigitalEd Week: Student Engagement Strategies & TEL Tools

DigitalEd Week: The Student Partnership in Enhancing Digital Teaching & Learning

DigitalEd Week: Towards a Culture of Academic Integrity

DigitalEd Week: Using Games in Moodle & Gradebook Setup

Getting Started with NitroPro

Getting Up & Running with Digital Open Badges - Part 1 (Level 2 & 3)

Getting Up & Running with Digital Open Badges - Part 2 (Level 2 & 3)

Getting Up & Running with Digital Open Badges (Part 1)

Getting Up & Running with Digital Open Badges (Part 2)

GIHS T&L Workshop: Assessment Transformation Framework

GIHS T&L Workshop: Designing your Module Learning Experience

GIHS T&L Workshop: Introducing the Programmatic Review Framework 3 Themes

GIHS T&L Workshop: Writing Learning Outcomes

GMIT Christmas Teaching & Learning Showcase

GMIT Digital Champions Insight Symposium

GMIT Digital Insights Symposium

GMIT Digital Learning Forum Showcase

GMIT Digital Learning Projects Insight Session

Gradebook Setup & Grades on Moodle

Grades on Moodle

Grades on Moodle - Post Assessment Tips and Guidelines

H5P - Building Creative Teaching & Learning Resources in Moodle (Level 2 & 3)

H5P - Learning by Doing

Implementing the Programmatic Review Transformation Framework - Assessment, Employability & Sustainability

Implementing UDL in your Teaching & Learning Practice

Improving student engagement and success in independent learning in HE - Prof. Liz Thomas

Introducing the Professional Services Digital Badge & the Academic Digital Badge by DigitalEd

Introduction to Decisions

Introduction to Mentimeter

Introduction to MS Teams for Professional Services

Introduction to Padlet: Using Padlet for online class activities and interaction.

Introduction to PebblePad (Level 1, 2 & 3)

Introduction to Vevox

Learning Design for Blended and Online Learning Modules Clinic

Learning Design Workshop - Part 1: Designing a module learning experience for online or blended learning (Level 1, 2 & 3)

Learning Design Workshop - Part 2: Assessment Strategy Planning (Level 1, 2 & 3)

Learning Design Workshop 1: Re-designing a module for blended/online/classroom-based delivery.

Library Reading Lists for Academics (Level 1, 2 & 3)

LIS Lecturers Network Planning Meeting & Workshop

Managing Academic Integrity in Online Exams

Mayo Campus Workshop: Implementing the Programmatic Review Transformation Framework
(PRTF) - Assessment, Employability & Sustainability

Microsoft Backup/OneDrive Save & Restore (Level 1)

Microsoft PowerPoint - Advanced (Level 2 & 3)

Microsoft PowerPoint - Introduction (Level 1)

Microsoft SharePoint & OneDrive (Level 1)

Microsoft Stream - Introduction (Level 1, 2 & 3)

Microsoft Teams - Icebreakers

Microsoft Teams - Introduction (Level 1)

Microsoft Teams - Live Lecture (Level 1)

Moodle - Setting Up Assessments (Level 1)

Moodle Gradebook 3 Step Setup (Level 1)

Moodle Gradebook: Set-up and top tips

Moodle Graded Forum (Level 1)

Moodle Groups (Level 1)

Moodle Quiz (Level 1)

Moodle Training - Assessment (Level 1, 2 & 3)

Moodle Training - Assignments & Quizzes

Moodle Training - Design (Level 1, 2 & 3)

Moodle Training - Gradebook (Level 1, 2 & 3)

Moodle Training - Reports (Level 1, 2 & 3)

Moodle Workshop (Level 1)

Moodle, Teams & Tools

More than MCQs! Create a robust quiz in Moodle

MS Bookings - Administrator Training

New Irish Copyright Licensing Agency (ICLA) License for Academic Staff in GMIT (Level 1, 2 & 3)

Online Assessment Clinics

Open Scholarship - Why do we need it & how can you get involved?

Practical and Pedagogical Approaches to Online and Blended Learning Design with Dr Orna Farrell,
DCU

Professional Services Digital Badge by DigitalEd for IT Sligo

Recording a Lecture with Teams, PowerPoint or Screencasting (Level 1)

Re-imagining Assessment Workshop: Creating Feedback Opportunities within the Curriculum - Leveraging time to maximise the impact, A Masterclass with Dr Edd Pitt

Re-imagining Assessment: Assessing Experiential Learning, A Masterclass with Professor Rick Roe

Re-imagining Assessment: Development of Rubrics for Assessment, A Masterclass with Linda Suskie (USA)

Re-imagining Assessment: Making it real! A Masterclass with Kay Sambell & Sally Brown

Reusable Learning Objects (RLOs) - What, why and where.

Seminar online in GMIT with SUNY on Communication and Engagement Strategies for Online Students

Setting Up Assessments on Moodle

Setting Up Breakout Rooms & Collaborative Online Learning Games (Level 1, 2 & 3)

Setting Up Online Assessment & Managing Academic Integrity

SoB Workshop: Assessment Transformation - Sharing Experiences - What Works & Why?

SoB Workshop: Exploring a Learning Design Process for any of module you teach & UDL considerations.

SoB Workshop: Implementing the Programmatic Review Transformation Framework (PRTF) - Assessment, Employability & Sustainability

SoB Workshop: Writing Learning Outcomes

Steps to Planning & Producing a Public MS Teams Live Event with External Presenters

Student engagement strategies for online/blended teaching & learning using Breakout Rooms + assessment strategies to consider.

Studiosity: Online, Out-of-Hours Academic Support Service for GMIT Students (Level 1, 2 & 3)

T&L Workshop with University of Southern Denmark

Teaching Enhanced Learning (TEL) Tools for a Blended Learning Teaching Model (Level 1)

Teaching Online Support Clinic

The 7 Wonders of Moodle: Call and See Em! (H5P)

The 7 Wonders of Moodle: The Temple of Artemis at "Assess-Us"

The 7 Wonders of Moodle: MCQ Picchu

The 7 Wonders of Moodle: Petra-fied

The 7 Wonders of Moodle: Taj Mahoodle

The 7 Wonders of Moodle: The Grade Wall of Moodle

The 7 Wonders of Moodle: The Lighthouse of Analytics, Egypt

Universal Design for Teaching and Learning (UDL): Making a difference in higher education (Level 1, 2 & 3)

Use your Videos to Create Reusable Learning Objects in Camtasia

Using ePortfolios Show & Tell: PebblePad in Medical Science

Using MS Forms for Quizzes, Polls and Feedback

Using MS Stream for Editing, Structuring & Sharing Videos

Using Teams Effectively for Online Delivery / Integration with Moodle VLE (Level 1, 2 & 3)

Using the Class NoteBook

Using the OneNote class notebook for collaboration, group work and assignments.

Vevox - Interactive tool for engagement in meetings & classes

Video Editing with Camtasia

Video Editing with Windows 10 Video Editor

VIT&L Event: Celebration and launch of the CUA DigitalEd Case Study Collection Publication

What the H5P!? Hands On Workshop

Working with Breakout Rooms on TEAMS

Writing Learning Outcomes

Writing learning outcomes and the assessment strategy for a programme or module.

4 Survey open ended question detail of colour coded data

The question was "What was your biggest problem when working/studying from home?"

The answers were exported from Excel into Word and coded as follows

Coding colours and number of supporting quotes

Bad Internet	100
Focus	75
Hybrid	30
Investment led to better Experience	29
No Problems	27
Loneliness/Worry	22
Timetabling / Scheduling	15
Commuting	11
Training	11
IT Support	11
Suitable space to work in at home	9
Accommodation	4
Change	3
Too much screen time	3
Printing	2

Having the right internet speed and the correct software

Harder to learn online than in a lecture hall

Internet speed and not having full access to the given laptops to download applications that could help and make studying easier

Easy to loose attention

being alone

I live in a very rural area and the choice of broadband isn't great. Therefore the biggest issue was my internet connection. Some days it would be great and working perfectly and others, it would be slow and wouldn't work at all. The anxiety that surrounds whether or not it was going to work on a certain day didn't help nerves surrounding presentations or online exams either. I found myself worrying it would just disconnect and stop working half way through a live presentation or oral exam for example.

I must prefer being present in a class to learn where my head can switch on at all at home. Also, the lecture can assist you or even stay back to help you directly whereas its better hard to get that interaction online

Network Speed was poor. Would have been nice to have a conversation in person as Team calls weren't the same thing.

Two parents working from home on video conferencing calls resulted in a poor internet connection.

not having access to a printer.... mine packed up!

Motivation

"At the start of pandemic my internet was extremely poor and lectures were not possible with video. I invested heavily in my internet at home and it works well now. If GMIT covered some of the cost of my investment it would be appreciated. I also had to invest in a new desk etc.

I enjoy working from home and also enjoy going to meet students and staff. Lectures online work well and attendance is superb still. Tutorials online are a disaster as one cannot assess what students are doing and what issues they have with content. Tutorials must be onsite. I love doing labs onsite. And I love my job in GMIT!!"

"Note: re Q about Institute device: I purchased new computer in year prior to Institute providing their device when Institute refused to support such. I continued on my own device as I had become accustomed to it.

I can just about get by with IT technology, am not trained or proficient and rely heavily on the IT support staff provided by the School. These staff are always supportive & helpful, although it is clear they have an excessive workload.

This week, my internet connection has failed tice; a new 'development' which left me and my class grounded. Recurred again two days later"

Not switching off, working more hours than contracted feeling you should always be contactable

Hybrid laptop overheating and crashing

Being able to walk away from work and switch off in the evening. As work became part of home life it was very difficult to switch off

Day to day contact with colleagues and discussing issues specific to modules, students or research. I would have been able to approach colleagues in a relaxed manner and ask specific question in relation to work whereas now I generall email and it all feels a bit more formal so sometimes I do not contact them and spend more time trying to understand and figure things out on my own. THis is fine and I like it but being able to approac a colleague in the corridor in an informal way was very beneficial. Therefore a hybrid model suits me best.

Engaging with students.

"Change - everything changed really quickly and several times. Just as I was getting used to a new way of logging in or doing something, it changed again, mostly without notice.

The lack of support that you don't even realise you have when you're working onsite.

Complete apathy towards the admin staff and the amount of change and upheaval we went through"

"Upskilling for on-line delivery.

Finding suitable on-line resources for practical laboratory work (Lab Sims useful).

Did find the support from Teaching & Learning office very good, as well as the video tutorials. Delivering content while training myself was challenging. "

The random nature of it. If I knew I was working from home full time I could prepare properly for it. Some modules should be made 100% online. Lectures could then mix with on campus modules or choose all online modules if they prefer.

Teams bandwidth beyond my internet capacity. internet frequently freeze during meetings. Also having space for an office and furniture etc.

Internet connection sometimes cut out. Apart from this, I found online lectures were very interactive and worked really well when using Socrative and Padlet as supplementary learning tools.

There were no problems while working from home apart from wifi on the rare occasion.

"The student timetable. Some classes were timetabled for four lectures back to back. Probably acceptable onsite but not online.

Didn't really have problems but had to select an option in Q8."

Negative impact on work-life balance, lack of meaningful interaction and collaboration with students and colleagues. An Impoverished learning environment when compared with the on campus experience for students.

Not being able to download software I needed in an efficient manner.

Wifi cutting off

Internet

Motivation to study

Lack of concentration

Lack of concentration and engaging with

I had a bad computer that couldn't run SPSS and other programs but I have since upgraded

Unstable internet connection and not having a private place to work at home

Internet connection slowing everything down

so many group assignments where it was impossible to get everyone to participate

Balancing a learning and a living/relaxing environment

The WiFi dropping during the lecture and having to rewatch it later that day

It is that lecturers think they can cover more material online than online. It is harder to ask questions.

Internet is sometimes terrible and staring into a computer screen is very difficult after a long while

unreliable internet

Lecturers not recording lectures. I think when we go back on campus for lecturers if it's possible the lecturers could still record the lectures by presenting it to the in person class on teams and recording it. This would allow people who are sick and unable to attend to still get the information for the lectures.

no big problems... I actually prefer it. I like how it is now. I like the lectures being online and not in person.

getting into a good routine for doing lectures

Internet problem

Couldn't meet with my friends

Slow internet

motivation, lack of routine, too many hours in front of a screen.

Internet

Lack of concentration

The Internet. I get booted put of lectures due to my WiFi and work takes ages.

motivation problems

Moodle can be confusing

Bad wifi at times

Face to face interaction would be better for some subjects, but not all!

i had no problems studying from home

Lack of concentration and distractions

"Price of home office equipment, especially office chairs and desks.

Making the home office environment ergonomic"

Not having admin rights to download some apps on the computer provided by the PhD funding.

That i get distracted very often and it is hard to engage in every lecture of the day

Internet connection, just a laptop is hard to use, a PC or separate screen would be helpful

I cant rely on good internet and i dont learn as well. Its hard to understand the lectureres during activities and its hard to concentrate

I enjoyed working from home so can't say I had any major problems. Maybe computer freezing or internet cutting out mid lecture but didnt happen that often

Poor internet connection

Internet

When there was a storm last year (2020/21) the wifi cut out in the middle of an exam and I wasn't able to finish a final (quiz on Moodle) on time, but had to request an extension. If the connection would have cut out it would be less stressful for everyone involved (teachers, me) and more fair.

hardware/software, its quality and my limited experience with IT

Not always being able to pay attention. It's easier to not go the lectures

Working from home for me has been essential since the pandemic I am living back at home in Dublin with a 3 month old baby and currently doing work placement in Mullingar hospital commuting each day for the rest of this year. I am very anxious about potentially having to return to onsite learning for my final 4th year. I cannot move my partner and baby back to Galway and the commute from Dublin - Galway 5 days a week would not be possible. I hope hybrid learning can be the way forward, possibly with the onsite lectures recorded live for students that cannot attend for various reasons, commuting, illness, anxiety etc. Thanks for taking the time to read.

doing lectures and coursework online results in a lot of screen time

Wifi connection

Not enough help when it comes to labs, would rather lectures online and labs in campus pubs it way better. Next week on Travelling up and down to galway every day will be a pain not sure how I'm going to manage as there is no bud at 7:50

Slow PC and poor WiFi at times

Computer is very slow

Can't concentrate on the lecture

"Distractions and slow computer"

Noise and concentration

Unhelpful lecturer's who wouldn't take students with bad Internet into consideration. Total waste of time. Ruined college for me and many others. Gave an unfair advantage to those in better areas of interet connection. This will reflect on my results negatively but it has become apparent that the college will not care about this and I will not be repeating any exam, pass or fail, I have given up on it at this stage. Also the college needs to take into consideration students who work part time in

order to pay for college. Fine and well those students who sit around all day, but those who have to pay their own fee's need to be able to work.

Lack of direction. Feeling lost and confused at times. But the staff, IT, teachers in GMIT are very supportive, friendly and always happy to help.

Having both on campus and remote lectures on the same day, had to leave online class early to get a train

Lack of Motivation , harder to express confusion in terms of material , getting kicked out of lectures because WiFi is too bad causing missing lectures

Hard to keep a schedule, very easy to slip into bad habits

Lack of motivation

Not engaging in lectures causing me to   confused in what was learned...

College not providing me with admin rights for installing software, I'm a computing student I need to install many different software, found it heart breaking having to ask for things to be installed every other week. This year most of the software i need is not installed. I need admin access being a computing student.

Not being able to form a routine with online study and work from home

Staying in calls without being disconnected

I had to by new laptop in order to complete the course as my older laptop wasn't able for the load of internet and everything else.

Slow Internet

internet connection, electricity expensive

The lack of accommodation to different learning types.

"the motivation to actually do the work.

m laptop being able to handle all the tabs and programmes opened at the same time without freezing, "

Getting in contact with lecturers!

at the beginning getting an area set up but now it works perfectly for me and I feel settled

Socially hard to be motivated, others living in the house, noise

Lack of social interactions and wifi

Losing internet connections sometimes during lectures and exams

Health issure , mental health , physical health.

The timetable.

Having a loud environment not being able to go into college to escape for proper study

Dealing with Wifi drop outs and Ms teams not working correctly in terms of joining meetings

No interaction between students and lecturers

Communication with peers - HUMANS!!!!!!!!

- irresponsible peers makes group work experience low

- peers using lecture time to do other activities has make communications hard cause they are not in the situation

- peers are not engaging the module... ... Not reading emails, Moodle etc

- poor computer skills of peers like not knowing how to save files or not knowing how to use Word or Excel in year 3 causes lecturers to have to spend a lottttt of time to teach them how....

Connection issues had a handful of exams that during would take ages to load or would crash luckily the lecturers where very understanding

Internet and long hours

Unavailability of an appropriate desk/workplace

My internet connection was very bad and my computer was slow so it took me more time to connect to teams for the lectures. But when In my free times I just go back to listen to the lectures again.

Concentration

not having a comfortable seat to study. a lot of back pain so would just do it from bed.

Internet

wifi problems

Internet cutting out

Poor computer takes a long time to do anything on

Very isolating and difficult

"Internet. We have a big family and constantly go over our data allowance within 4-5 days of every month so I'm left with no internet and need to use my phone data, which is slow and not ideal to be working off my phone.

Not having an adequate work space was also a problem and lead to high levels of stress and lack of motivation "

Mostly Internet connection, and availability to required software like Adobe

WiFi

Self-discipline/scheduling

Bad internet connection

Internet

"Internet signal and getting a quiet area in the house to study at "

distractions

Concentration and losing connection during a lecture.

The internet is very bad

Lectures werent recorded

sometimes there is a lack of clear indication in certain subjects as to what needs to be reviewed or learned

Lack of support from colleagues and supervisors

motivation and concentration

I personally prefer the online lectures but I live in apartment in the city center with 3 other students and we all often have lecture at the same time so the internet tends to be slow and turns on and off.

Poor internet, difficulty engaging with material over video calls

Personal Time Managment

Internet would drop out or change in quality throughout the work day

Concentration and getting easily distracted

Internet speed is definitely the biggest problem. I have to tether my phone's internet and it's quite slow. When it goes it takes a good while to get it back working right

Internet connection

no problem..just me tired working and studying. id say covid burnout only. online college was great

Internet connection and trying to concentrate on lectures for long periods

That i have no broadband in my home and i have to use a mobile hotspot

Trying to get motivated

Maintaining consistency in taking short breaks. I tend to get too focused sometimes.

I felt people got to used to taking over lectures with talking about other topics and messing in the chat. The lectures should be more structured

Hard to concentrate for a long time online

Time management

Having no opportunity to ask quick little questions, instead relying on online class forums where response times can be lengthy.

With 5 students in the one house doing online lectures, our wifi is slow. Only half of us can use wifi while the other half hotspot our laptops using mobile data. We have Vodafone GB 1000 Fibre Broadband and a booster, but it's still not enough for all devices unfortunately.

I live in the mountains with no internet!

I get fewer breaks at home, but I have no commute.

Unsuitable arrangements regarding where and when I could undertake study.

To keep concentration with distractions at home

Working off computer screen only when the larger monitor was in the office. As I am teaching on a new MSc programme which is online in the evening it would be very beneficial to have a 2nd monitor.

No problem

Poor internet causing lectures to be interrupted/ break up.

Found it very manageable as all notes are lectures were put on moodle

Keeping focus

"Distractions around me"

lack of Collaboration with other students. Lecturers were very responsive to any queries or difficulties, Forums are a good place to discuss with peers but simply isnt near the level of what mingling with other students is. I'd like more group lectures/labs for all modules, thry were only offered for 1 of my modules

Distractions, unable to focus. I would go to the college library or public library to do online lectures and study anyways.

Not having direct face to face contact with class mates and lecturers when I'm having trouble with the course. Class mates and lecturers are fantastic to get back to me with help but sometimes it is easier to explain and discuss an issue face to face

Calls dropping, computer not powerful enough to support software that require a lot of resources

less movement, face to face communication

Lack of motivation to do well from listening to hours and hours of lecture on a screen. Was impossible to take any information in after a certain point. Very artificial. Learn much better in a classroom setting. Finding it difficult being my final year trying to do well in exams when I cannot focus or concentrate on someone talking on a screen

"Getting set up, accessing Moodle etc.

I'd happily attend on-site to get set up then I'd be OK "

I travel from Wicklow to Galway on Mondays. Which at the moment is an online day for my year. I only have weekday accommodation which means I can not be there on the weekends. This is difficult for me as there is very little internet on the methods of transport that I take. From cars, trains and busses. So overall it is only Mondays classes that I can never really attend.

None

Home interuptions

Finding time to learn and to work

Reading textbooks on desktop is very difficult and painful on the eyes, even at lowest brightness with orange light filter on, which is incredibly fatiguing overall. I have been converting the files to epub/pdf for Kindle reading, but diagrams and figures are lost. In a previous remote course, however, I had lost my internet connection entirely for well over a month (due to the engineers sent

by the internet providers pretending to have come to the house and fixed the problem) and had to use hotspots to finish my assignments and thesis.

I have no space to put a study desk and the wifi is really bad so i depend on public places to study

This was the first time our course was offered as a remote option. There were issues with the virtual labs being DOG SLOW and also with third party learning supports not being correctly configured/slow. Occasionally there were issues with the lecturer's internet which affected the online classes and necessitated the lecturer disconnecting/reconnecting. The availability of good notes and recorded lectures made it a very positive experience. I believe continued availability of courses that are completely remote will be hugely beneficial, in particular to carers, stay at home moms and single parents - demographics that frequently suffer because simple supports are not in place to facilitate their continued education. I see no reason why all tech courses can not be offered as completely remote options as well - it could increase the number of students you can onboard.

Live in a small granny flat with my boyfriend who also had classes so was very hard period but now use office in GMIT.

None.

Either a slow internet connection or an internet outage, at any time of day, doesn't matter if I was in an online class or working on assignments.

accommodation and the unknowing of what would happen in advance

boring hard to focus

My personal hotspot not connecting to my laptop - I live in a student house with no wifi and my connectivity is very tempermental

Finding time

The internet was really bad on teams and the social aspect wasn't there either

Looking at the computer all day was too long

Online learning is not my method of learning, grades dropped ridiculously bad no matter how hard I studied, online learning not only was difficult but exams were made so much harder and unfair (eg negative marking, you're better off leaving a blank than making an attempt at a question). With online learning too the lectures for some reason were scheduled back to back with no breaks just because we were at home doesn't mean we didn't need a few mins of a break between lectures so that we could be wide awake and focused for the next, as was in college you'd always have that break of getting from one class to the next. Very unhealthy method and I felt GMIT handled the whole situation just dire and didn't take any of the student complaints on these topics into consideration

Internet issues, specially when there was a bad weather outside

I found it hard to engage with the lectures while at home. It is harder to retain knowledge and concentrate

Getting out of bed for 9am lectures

Staying concentrated and engaged

Home study is good as I can go back over class recordings in my own time but I think we would have better discussions in a classroom setting as I feel people are shy to join in from home

As I work full time I have to rely on the recordings of the class. I miss out on the live chat and the chance to give my opinions. I am also missing out on getting to know the other students and the lecturers.I don't have the opportunity to participate in group work.

internet problems

getting the time while working full time

I have no major problems studying online and i like it. I am a mature student who lives a bit away from the college so it suited me as it was quiet and no time wasted on travelling in and out of campus.

Couldn't concentrate

I get distracted easily especially when a lesson is not interesting or I just don't understand. If I was in college I would of interacted to keep interested and ask the tutor before or after class if I was struggling.

"Setting a proper working area. However I had the opportunity to put my hands on a good laptop and extra screen which make the home studying experience very satisfactory.Moodle site and Teams are great and the Lectures are doing a very good job.

I don't have any issues with internet connection, but a couple of times my internet drop down and it wasn't good as I was in the middle of a group exercise. As a mature student and full time worker i prefer online learning than going to class."

Understanding modules and some assignments given out

"Intermittent signal as I live in the wilds of Longford and coverage could be a bit erratic.

Otherwise fine."

N/A

I need a stand up desk to improve ergonomics,

Some conversations take longer than needed because people work asynchronously

paying attention

Difficulty focusing due to personal situation at home

Internet failing due to online exams being held during peak work/ school hours for my household.

If the internet is having a slow day, i can't complete my tasks and will fall behind.

Being isolated. Not having fellow student camaraderie in terms of advice, information, talk about things such as assignments, projects, giving out about everything anything (purge). Also not being able to get timely and appropriate information from some lecturers, where some lecturers never responded to student emails a number of times. Some or all of these could be resolved with a hybrid system.

Isolation, little personal interaction, however by my location I could not do on-site education.

Lack of interaction with lecturers which is why I think a mix of onsite and offsite could be good to help students in many ways such as finance, family support by working from home and less commuting to allow for more study time but by being onsite once or twice a week with interactions with lecturers would be of great benefit to students.

I didn't have much problems. I am good with computers and I like being able to do the college work whenever suits me because I work full time aswell. I am a mature student though so I would be more willing to do the work rather than ignoring it, like I did the first time I was in college at 18.

Lack of motivation, too many distractions opposed to college.

My laptop is really bad

sitting in front of the laptop most of the and zooning out during half my lectures

Loneliness and struggle concentrate

A lack of support in technical issues, for example my endnote worked on my computer properly which wasn't an issue. Then my computer broke and now I have to share a relatives computer, which is not only awkward but I cannot get Endnote to work on it at all. Now I have to reference everything manually and all this could be rectified if I could get IT support, or just use the computers in the library to do my project work.

Internet connection, laptop freezing from so many things running a

"Internet speeds"

lectures not very interactive

Harder to engage

Bad internet connect

Bad internet

Lecturers weren't giving us their fullest.

"If you really want to study and have a passion to study you can study from anywhere

I prefer to study from home lots of Pros only

Question no 8 it needs to add none of the above "

Not seeing people

None

"just trying to stick to a plan of studying after working all day!"

Kids!

It's quite difficult to pay attention and learn properly from home due to disturbances and calls dropping

Wifi being slow and cutting out. Especially when videos are loading or I'm in the middle of work.

Procrastination and lack of discipline

Wifi connection

Isolation

Struggling to focus on the work

felt overwhelmed with the work load

None, I perform best when working/ studying from home

I enjoy remote learning but sometimes when I get to a stumbling block on something I am studying, not having the ability to get answer quickly can be frustrating.

WIFI cutting off

Time (with a young family)

I basically live in middle of nowhere and my internet connection is extremely poor where I often get zero internet connection. There is only one spot in the house where I can get some internet connection from my phone but it'll be gone in hours again.

WiFi going in middle of lectures or computer crashing

WiFi Devices

Harder to focus. I learn better when in person

I have very poor wifi at home so I go to my brothers house for class. They have really good wifi. That's the only problem I have had. I would much prefer for classes to stay online.

Figuring out how to access resorces

Find the balance between study time and family/home time. Lack of communication with you colleagues (face to face) from your course.

Slow internet, lack of resources

Motivation, lack of teamwork.

being in a home setting would be the issue so much around you that can distract you from actually learning the material., then on top of being in front of the computer all day for lectures or things. one would then have work to do afterwards on the computer. so the strain on eyes and mind can be exhausting. not a fan of the new style of teaching that exists currently. to question question 8 the biggest challenge wasn't essentially just equipment or bad computer or training, its the fact that the whole style of learning is changed and living and working in a small apartment isn't viable for most individuals and creates challenges that are not easily categorized.

Poor equipment (desk, chair)

Stopping myself from doing the household chores!

Hi need to be on site most of the time when there are students in the labs. It is great to have the option to work from home when I have computer based work to do.

No major problems really. Perhaps some refresher training in Outlook/TEAMS to support remote working.

"Lack of interaction with others.

I felt stressed from having to work on a device all day - more occasions for movement onsite, more variety of work."

None

No problems it was great

When connecting to the remote access - server connection issue - closing out of remote to quick having to reconnect several times.

Not having access to a printer

Space. Dedicated work station full time not possible. For online meetings backgound is not "professional"

Understanding in students

Lack of space, suitable desk and chair at home that would ordinarily be provided

The lack of colleagues around to ask how to do anything   lack of training/information for some specific topics

Poor internet

I didn't have too many technical difficulties as MS Teams and Moodle generally worked well. Thanks for the support over this period.

Disconnect from colleagues and students. Online does not replicate the human element associated with education and pedagodgy. (I know it's not really a technical issue but other ways to replicate this human element, other than TEAMS/Moodle would be welcome)

Poor Broadband

"Maintaining quality and integrity in online assessment.

Getting the students to engage online"

When working from home full time you can feel a bit isolated It is difficult to know how your getting on. A hybrid approach is much better as at least you get to interact with colleagues and a change of scene is good.

Postural issues due to having an old office chair that does not provide adequate support for my back.

My internet can let me down sometimes.

The only issue were days when I had labs and lectures too close together to work from home. I had to do a number of lectures from the shared office.

Physical set up, desk/chair etc.

Apartment too small. No space. Bad for mental health and relationships in the home.

Getting students to engage

timetabling

Recording lectures and trying to make interactive content casued alot of headaches - as these were new skills. This wasnt due to internet speed or computer spec. but use of things such as Whitebord and the stylus were great once got to grips with them but some training would have helped.

Terrible internet

students internet access to good Wi-Fi

Accessing resources normally used in computer labs. We use a lot of virtualization and this proved very difficult to get students up and running - students also used different devices / OS which caused compatibility issues

Terrible Internet, even though I live in the city.

Lack of IT support.

Poor Internet and / or WiFi connectivity at times (although relatively infrequently).

I have a 3in1 device which makes a hybrid working style very easy to operate. I have no issues when working from home - I pay for high speed broadband and am lucky to be in an area where this is possible.

Internet Speed

"Originally it was the lack of set-up. When I was working at home from my laptop (pre-covid and for the first few months) my posture was poor but now I have a docking station and a fantastic set up at home thanks to Science IT team and it's a joy to work from my home office. I've purchased a holder for my tablet when it's docked so that it's at eye-height, and I've also purchased a good mic and pop filter to improve the sound quality of my lectures. These were inexpensive but have really added to my home office and may be useful for GMIT to provide to other staff who are working from home all the time now.

For question 8, these issues no longer apply to me, but originally I had issues with device, training etc."

Workload increased Lack of engagement with students.

Issues with laptop, inadequate support from IT when there are issues.

During lockdown my internet was sometimes slow. This is no longer an issue since poor people have returned to work.