

Research Title

A feasibility study to critically appraise the opportunities and obstacles towards the development of online learning and teaching practices.

Abstract

This feasibility study has been carried out to critically appraise the opportunities and/or obstacles towards the development of online learning and teaching practices.

It has investigated how the success of online learning historically has been measured in order to assess the level of learning and understanding achieved. It has investigated what factors influenced the levels of learning and understanding achieved in an online platform. A literature review was carried out to address these first two research questions.

Finally, an educational case study investigated what opportunities and/or obstacles might affect the design and delivery of online modules at Galway-Mayo Institute of Technology (GMIT) at this present time. Primary research was carried out as a mixed-methods empirical research to address this third research question.

Current students (2015-16) in the Built Environment (BE) at GMIT were invited to participate in an online survey using 'google forms'. An emailed structured questionnaire was used to survey a representative educator from another campus. One unstructured interview and two semi-structured interviews were conducted face-to-face, two with management representatives and the other with an active researcher.

Findings suggest using an online pedagogical approach is a significant change and paradigm shift in the Higher Education (HE) landscape in Ireland. Management of this change, including blended learning and flipped-classroom approaches, will require the development and publication of a policy document on online learning within HE establishments which do not have such a policy document already. It should be noted that HE establishments in Ireland are autonomous but accountable through the Higher Education Authority (HEA).

There is great scope for the development of teaching material online at undergraduate, postgraduate and professional levels. This feasibility study has outlined a series of options for assessing deeper levels of understanding and learning online, pedagogical approach as well as extrinsic and intrinsic factors which may or may not influence greater metacognition. Each warrants trial and further investigation. Team delivery, inclusion of expert lecturers and collaborative-partner opportunities with industry are also areas for further research and development.

If a significant amount of these initiatives were trialled when designing an online module, parallel research streams would generate data in a number of areas at the same time. They could subsequently be assessed using mixed methods analysis reviewed through a deductive critical theory backdrop and curriculum research perspective. Research findings could thereafter be used to inform or update online policy documentation or be used towards the publication of a best-practice guide on online learning for educators and learners alike.

1.0 Introduction

Online learning facilitates all learners, including *'adult learners... who often have significant work and family commitments, the convenience and flexibility they need to learn anytime, anywhere'* (Marks et al. 2014, p2). In this paper, I have explored online pedagogical research as a principal change in HE approach and its projected change management.

The optimised delivery of learning for greater metacognition is the aspirational aim when developing online modules. Where and how this is assessed varies in the literature, along with the nature and frequency of assessment. Marks et al suggests a staged approach before, during and after participation online to gauge whether application of the learning has been successful (2014, p3), whereas Garrison and Cleveland-Innes used a questionnaire to gauge changes in students strategies in their learning depending on its delivery, although they were only striving for higher order learning in one out of four module designs presented in their paper (2005, p133).

Students examination performance correlated to subjective learning is suggested by Stehle et al as a way of assessing the success of teaching practices online (2012, p1). Equally valid is the approach of Gregori et al, who proved in their case study that a greater technological presence of student to teacher, student to student and student to material reflects in higher results and *'quality of learning'* (2012, p467, 469).

People in varying roles will have different motivation when participating in online modules or reading its research findings. Academics will be looking at online pedagogical approaches and learning tools utilised with a critical eye. Learners will want to prove they have met the learning outcomes of a module by successful achievement in the assessments set. As a researcher, I will be trying to assess a hypothesis in relation to online learning. It is a complicated and divergent set of agendas.

Traditionally, on undergraduate programmes in Ireland, online learning, flipped-classrooms and blended learning are not used. This feasibility study includes an educational case study based on the BE programmes at GMIT for further exploration of the current opportunities and/or obstacles towards the development of online learning.

GMIT is an Institute of Technology (IT) which was established in Galway as the only Regional Technical College (RTC) in the West of Ireland in 1972 (GMIT 2016b). In November 2015, GMIT formally entered into an agreement with Letterkenny IT and IT Sligo to progress the already existing Connaught Ulster Alliance (CUA) towards Technical University (TU) designation (GMIT 2015).

GMIT has campuses in five locations, two of which offer programmes in the BE, as listed in Table 1.0 below. Currently, there are no formal options for part time, flexible delivery, flipped classroom or online learning on any of the programmes listed.

Main Galway Campus, GMIT, Galway	Castlebar Campus, GMIT, Co. Mayo
Full time Undergraduate Programmes	Full time Undergraduate Programmes
BSc (Hons) Architectural Technology	BSc (Hons) Sustainable Building Technology
BSc (Hons) Quantity Surveying	-
BSc (Hons) Construction Management	-
BSc (Hons) Civil Engineering	-
Taught Postgraduate Programmes	Taught Postgraduate Programmes
MSc Environmental Resource Management	-

Table 1.0 GMIT BE Programmes (CAO 2016).

1.1 Aim

The aim of this research is to conduct a feasibility study in order to critically appraise the opportunities and / or obstacles towards the development of online learning and teaching practices.

1.2 Research Questions

1. How has the success of online learning historically been measured in order to assess the level of learning and understanding achieved?
2. What factors influence the levels of learning and understanding achieved in an online platform?
3. What opportunities and/or obstacles will I face in order to further my research at GMIT, bearing in mind the needs of key stakeholders at this time?

1.3 Methodology

According to Pat Thompson, methodology represents *'theory about the research methods that will be used... which research tradition to work within, what knowledges to draw on'* (Thomson 2013).

I have considered the adaption of *'a publications-as-theory strategy'* in this feasibility study (Bryman 2012, p22). I have reviewed existing literature and have subsequently reassessed research questions periodically and iteratively, in keeping with Marx's suggested source of research questions (Marx 1997; cited in Bryman 2012, p86). Certainly, a publications-as-theory approach is a good description of how secondary research was conducted in this feasibility study around the first research question.

In terms of epistemology, I tend towards a phenomenological observational stance when interpreting qualitative research findings, in that *'human action is meaningful'*. I would aspire to interpret *'human actions and their social world from their point of view'* (Bryman 2012, p30). I have used this to inform my research design choices in relation to interview questions and approaches, as outlined further below.

I would tend towards a constructivist ontological consideration, where *'social phenomena and categories... are in a constant state of revision'*, which also includes a *'researchers' own accounts of the social world'*, in the context of HE research (Bryman 2012, p33). *'Knowledge is constructed based on personal experiences and hypotheses of the environment'* (Anon 2016).

The interviewees chosen, as outlined below, are representatives of a broad spectrum or cross-section of staff, with both male and female representation. Staff and students were of varying ages. Staff have extensive experience and each have different, unique skillsets. Some are from different departments

and others are from different campuses at GMIT. This is in keeping with my ontological stance, acknowledging that each interviewee has a constructed knowledge *'based on personal experience... (and) environment'* and that this will lead to varied interview responses (Anon 2016).

Mixed methods empirical research could be viewed *'through two different lenses'* of positivism and interpretive paradigms (Cohen et al. 2011, p31). Pragmatism is a paradigm which encompasses both quantitative and qualitative research, which I will adopt for the purposes of this research. Pragmatists believe that *'multiple paradigms can be used to address research problems'* (Creswell 2007, p10, 14-15), but must *'honour each and be explicit about when each is used'* (Greene et al. 1989; Creswell 2007, p15).

I have chosen to follow a deductive critical theory and curriculum research approach (Cohen et al. 2011, p31). *'The critical paradigm embodies different ideologies'*, including curriculum theory (Mack 2010, p9; Cohen et al. 2011, p37). Bassey states that educational research is quintessentially a *'...critical enquiry aimed at informing educational judgements in order to improve educational action'* (Bassey 1999; cited in Mack 2010, p10).

I would not consider this research to be politically driven, but it does strive towards *'a broader moral purpose'* in that I hope by developing online teaching tools to make specific educational content more accessible and easier to understand and remember for a greater cross section of students, and perhaps even for professionals, and members of the public, given time (Pring 2000; cited in Mack 2010, p11).

As a quote from Bernstein put it, *'how a society selects, classifies, distributes, transmits and evaluates the educational knowledge it considers to be public, reflects both the distribution of power and the principles of social control'* (Bernstein 1971, p47; cited by Cohen et al. 2011, p36). The research is approached with an *'openness towards education... with an emphasis on emergence, process epistemology and constructivist psychology'* (Doll 1993; cited in Cohen et al. 2011, p36).

According to Paulo Freire, a critical theorist, *'the school is a scenic community attitude'* where *'the curriculum itself must be seen as a part of the larger culture'* (Freire 1973; cited in Salehi 2013, p51). The curriculum *'is reflective of the objectives and the educational philosophies'* which are *'affected by the social political changes in both local and social contexts'* (Salehi & Mohammadkhani 2013, p51).

1.4 Scope and limitations

As a limitation to this feasibility study, I was advised during the management interview that negotiations within the CUA are at early stages and as yet there are no defined pathways for communication. As a result, interviews were not sought with CUA members.

This feasibility study includes a bounded educational case study with findings limited to GMIT BE programmes (Bryman 2012, p45). It contains mixed mode research, the qualitative side of which will mean that the case study findings, or secondary research, cannot be generalised beyond GMIT (Yilmaz 2013, p314). Thus my research findings have inductively informed my research design (Bryman 2012, p26).

A final limitation of this study is to not seek industry or professional body input, although they are key stakeholders in educational design (GMIT 2013, p13). In keeping with my epistemological and methodological position, I am wary of being led in a direction which is commercial or political in nature, rather than a student-centred approach to my research.

1.5 Methods

A review of literature has been conducted primarily through published peer reviewed journal articles via search engines such as google scholar and the library online search engines available through Lancaster University. I used keyword searches such as 'online', 'online learning', 'critical theory', 'pedagogy', and 'feasibility study'.

The empirical mixed-mode survey of key stakeholders at GMIT on BE programmes was conducted to ascertain their needs and opinion on online learning. The key stakeholders chosen and the method of data collection are listed in Table 2.0 below.

Key Stakeholder	Method of Survey	Data Collection	Numbers invited to Survey	Numbers Responded
GMIT BE students (2015-2016 cohort)	Online questionnaire	'Google forms'	319	50
A management representative	Unstructured interview	Notes taken during interview	1	1
An researcher and educator in Galway campus on Masters programme	Semi-structured interview	Notes taken during interview	1	1
An educator in Castlebar campus	Structured interview via email	Email response	1	1
A Learning and Teaching management representative	Semi-structured interview	Notes to be taken during interview	1	1

Table 2.0 Research Methods

Data from all interviews has been analysed. I have used grounded theory as a *method* of interpreting findings from qualitative data captured, looking for coding and themes in the findings, taking my own notes as I review interview notes and using inductive reasoning to reflect back on research questions in an iterative process (Charmaz 2014). As I have used grounded theory *methods* in my analysis of data findings, I hope to avoid issues of incommensurability (Trowler 2015, p867).

Some of the questions on the 'google forms' questionnaire are quantitative, whereas the interview findings are qualitative in nature. The reason for this was in the nature of the inquiry with each. Students' questions included simple choices between options for pedagogical choice, whereas staff interviews really needed to capture personal opinion and delve further to get an unbiased dialogue on online learning during each interview. Thus the reasons for mixed-methods is '*explicit... providing rationale for it gives ... the reader a better sense between the research question and the research methods*' (Bryman 2012, p649), in keeping with the philosophy of pragmatism paradigm.

Triangulation of the data findings and literature explored is subsequently conducted to seek validity and reliability of findings (Cohen et al. 2011, p196; Bryman 2012, p392).

1.6 Ethics

All survey participants have been given reassurances of confidentiality and anonymity wherever possible, with the option to opt-out at any time. Ethical considerations in keeping with the requirements at Lancaster University have been followed. All four interviewees were given an information sheet and a consent form at the outset.

I am wary of perceived encroachment of teaching duties when discussing online modules with lecturing staff. I have given reassurances that survey findings are purely for research purposes and have no other agenda.

2.0 Secondary Research

2.1 How has the success of online learning historically been measured in order to assess the level of learning and understanding achieved?

2.1.1 Peer reviewed Case Study Examples

2.1.1.1 Case Study – Practitioner Upskilling, Seven online modules, Pharmacists in Canada

Reporting on an *'Online Continuing Professional Education (CPE) Course for Pharmacists'* in 2010 in Canada, in order to assess the level of transfer of learning-into-practice which occurred, Marks et al collected qualitative data over a twelve month period. Pharmacists engaged in seven online modules, and were engaged in *'course activities in groups (n=15) over 18 weeks (per module), guided and supported by a moderator who facilitates learners' participation in course activities, provides formative feedback on submitted work, and supports learners' application of course concepts to practice'* (Marks et al. 2014, p3).

The online material was developed based on *'the principles of experiential learning'* (Kolb & Fry 1975; cited in Marks et al. 2014, p3) and *'cognitive apprenticeship'* (Collins et al. 1991; cited in Marks et al. 2014, p3), where *'experience is the starting point for learning'* (Marks et al. 2014, p3).

Qualitative research was subsequently conducted. Focus groups were conducted immediately after the course, semi-structured telephone interviews were conducted twelve months after the course and pre-interview online surveys were conducted approximately one week before interviews took place (n=84). Action plans submitted for assessments were used to verify emerging themes (Marks et al. 2014, p4).

The results from this case study suggest that experiential learning and cognitive apprenticeship models used in online CPE or CPD (Continuing Professional Development) courses *'can promote the achievement of practice-orientated outcomes'* (Marks et al. 2014, p14).

2.1.1.2 Case Study – Four Online Courses, United States (US), graduate students

However, Garrison and Cleveland-Innes argue that in order to facilitate a *'cognitive presence in online learning, interaction is not enough'*. Depth of learning was assessed by focussing *'on the nature of online interaction in four distance education course designs'* in the US over sixteen months, from January 2003 to April 2004. A *'Study Process Questionnaire'* was given to participants (n=75) *'to measure changes in how graduate students choose to strategize their learning in a particular learning setting. These can be either deep, surface or achievement approaches to learning'* (Garrison & Cleveland-Innes 2005, p133, p138).

The four courses had varying degrees of instructor involvement, formative feedback, opportunities for interaction, some were voluntary and only one of the four sought a higher order learning and critical thinking.

It should be noted that this paper makes no reference to the theoretical underpinnings or pedagogical approaches to learning and teaching in any of the four courses chosen to be assessed. There was no

information given on course content or learner's educational level or indeed level of learning achieved.

This paper's findings suggested that *'design had a significant impact on the nature of the interaction and whether students approached learning in a deep and meaningful manner. Structure and leadership were found to be crucial for online learners to take a deep and meaningful approach to learning'* (Garrison & Cleveland-Innes 2005, p133).

2.1.1.3 Case Study – Literature Review Only, Online Learning

Another peer reviewed paper by Chakraborty and Nafukho approached its analysis of online courses based on a literature review alone. The findings included a number of suggestions to strengthen student engagement in online learning, including *'creating and maintaining a positive learning environment, building a learning community, giving consistent feedback in a timely manner and using the right technology to deliver the right content'* (Chakraborty & Nafukho 2014, p782).

2.1.1.4 Case Study – Classroom, Student Evaluation of Teaching, Medical Students

On that note, case studies which are not relating to online learning but measure depth of learning achieved in a classroom setting should be scrutinised further as well. One such example measured teaching effectiveness by way of students evaluation of teaching (SETs) against practical examination and against multiple-choice test scores of medical students (n=883) enrolled in thirty two sections of the same course (Stehle et al. 2012, p1).

Findings concluded that *'students' subjective perception of learning significantly correlated with the practical examination score whereas no relation was found for subjective learning and the multiple choice test'* (Stehle et al. 2012, p1), which would tie in with experiential learning findings in general.

2.1.1.5 Case Study – One Online Module

Social presence, cognitive presence and teaching presence (be that a structure or process), are all thought to contribute to the educational experience within a community of inquiry (Figure 1, Gregori et al. 2012, p470; adapted from Garrison & Arbaugh 2007). Gregori et al's research investigated cognitive and technological presence, where interaction using technology was used to represent social and teacher presence.

Gregori et al have explored four online learning activities, using data to compare cognitive attainment achieved with two thousand one hundred and thirty written computer-mediated communications from participants (n=88) in an online setting, following the *'model of presences'*. The technological presence was assessed as *'interaction based on the degree in which the online student senses the availability of, and connectedness with, other students, the teacher and the context'*. The four-phase process used was *'initiation, exploration, integration and event resolution'* and their analysis demonstrated *'the influence of technological presence on the quality of learning results of the online knowledge construction process'* (Gregori et al. 2012, p467, 469).

2.1.2 Conclusion from Peer reviewed Case Study Examples

In all these case studies, the concluding research findings are always somewhat vague and are only contextualised to their specific hypothesis. If I were to strategize a thesis research proposal on foot of this feasibility study, for example, I would want findings which can be generalised and reflecting demonstrated best practice from a pedagogical and technical-content point of view.

Online modules should be assessed against a number of parameters, such as social presence, cognitive achievement and teaching presence. Interaction between teacher-learner, learner-learner, and learner-material are all significant and warrant investigation. Similarly, whether learning achieved would be considered deep, surface or achievement-driven will also have an impact.

Assessment design has significant impact on the level of learning achieved, as does structure and leadership in the module. Examination results and content of assessments, if strategically written, can be used to gauge the level of higher order metacognition achieved. Focus groups, interviews and online questionnaires sent at strategic times may help ascertain the level of learning and engagement achieved at various stages of the module delivery.

It is interesting to note that the first three points mentioned by Chakraborty and Nafukho are similar to that expected of a humanist or social constructivist pedagogical approach to learning and teaching and are not necessarily singularly affiliated with online learning practices.

I would agree with Chakraborty and Nafukho that not only should the right technology be used, but the data capture from such technology should be considered at the outset design so as to strategically capture the right types of data from learners as they interact with an online Learning Management System (LMS). This could be considered *'dataveillance'* in the context of educational research (Selwyn 2015, p64). A similar outcome was found by Gregori et al, which demonstrated *'the influence of technological presence on the quality of learning results'* (Gregori et al. 2012, p467, 469).

The process of inquiry mentioned by Stehle et al could be used for quality assurance purposes in order to instigate better teaching practices virtually. It could be assessed through action learning on a few cyclic iterations of an online modules commencement, for example. Quality assurance checks on teaching practices in an online module is another area of analysis which warrants further investigation.

2.2 What factors influence the levels of learning and understanding achieved in an online platform?

2.2.1 Extrinsic Factors

Professor Peter Barrett from the University of Salford heads up a team of researchers who investigate how behaviour is affected by the BE. The team have researched *'links between classroom design and learning within primary schools'* and have assessed factors such as *'lighting, noise levels, orientation, temperature and air quality... flexibility of the space, available storage, and even colour schemes'*. They monitored the academic progress of seven hundred and fifty one pupils over twelve months and noted an anticipated 25% increase in performance in reading, writing and mathematics between pupils occupying the *'best'* and *'worst classroom environments'* (Anon n.d.).

In particular, *'the amount of natural daylight and how it varies throughout the day has an important influence on the learning environment, but the daylight characteristics for a classroom are effectively fixed by the architect's original design and the building's orientation'* (Anon n.d.).

Online learning has the distinct advantage in allowing learners the freedom to choose their own learning environments, be that where and when they log on to the LMS or where and when they choose to engage in active, applied learning to complete course work designed to reinforce the learning outcomes from a particular module, for example.

It would be useful to consider data collection of these external, environmental factors of online participants whenever they login online through the LMS. This warrants further investigation. Perhaps

after significant iterations of online module development, suggested guidelines could be issued to online participants as to the optimised learning environment for increased performance in their studies based on student experience and grades, for example.

Similarly, a learners' physical and mental health and well-being during online study periods will have a significant impact on their performance. For full time attending students at GMIT, we host PASS sessions (Peer Assisted Study Sessions), a five-week welcome programme and a first year module entitled Learning and Innovation Skills (LIS) (GMIT 2016a).

Similar to the Chartered Institute of Architectural Technologists (CIAT), a '*Mentor Match me*' system could be set up between peers, to encourage engagement and retention in an online programme and provide pastoral care, alongside the module facilitators (Anon n.d.).

How can a student self-assess their readiness for learning at any given moment, physically and mentally, and report back for research data analysis, for example, as this plays into ones perceptions of ones' own understanding of what it means to *be well*. Wellness of online students could warrant further research and investigation. And on days when an online learner does not *feel well*, does this prejudice them towards an excuse not to study, for example?

Online studies have a tendency towards social exclusion, due to the nature of the interaction through computers and being devoid of direct human contact and perhaps compounded by time differences between students, for example.

Online mentoring circles could be used in an attempt to address this issue and warrants further investigation as well. Mentoring circles can help '*individuals gain access to networks, reduction in feelings of isolation, greater connectivity, increased confidence and commitments, career progression, knowledge acquisition, better understanding of the culture and academic demystification*' (Darwin 2000; cited in Darwin & Palmer 2009, p127).

Tai Chi Chuan (TCC) has been medically proven to have great physical and psychological benefits (Li et al. 2001). Using '*You tube*' resources, such as those available through many websites (e.g. Anon n.d.) could help online learners better prepare before engagement in their online studies.

The social aspect and possibility of interaction with other participants in an online module using adobe connect and webcams might engage more students and add another avenue for communication, movement breaks or ice breakers, for example, such as using a '*virtual coffee break*' during segments of live feed. There is scope for further research in this area as well.

2.2.1.1 Conclusion

There is scope for further research into the impact of external factors for online learners, such as environmental factors, their personal well-being, readiness for studies, peer-mentoring, mentoring circles, strategies for social inclusion, exercise and planned virtual social events. Their effect may have a significant impact on how well learners perform and the depth of learning achieved.

2.2.2 Intrinsic Factors

2.2.2.1 Learning Outcomes and Module Design

'The purpose of an educational experience, whether it is online, face-to-face, or a blending of both, is to structure the educational experience to achieve defined learning outcomes' (Garrison & Cleveland-Innes 2005, p134).

With the adoption of the National Framework of Qualifications (NFQ) by the National Qualifications Authority of Ireland (NQAI) (QQI n.d.), *'the notions of transparency and accountability for student learning outcomes represents a paradigm shift for higher education'* (Donnelly et al. 2010; Mac Keogh et al. 2010, p24).

Research by Prensky suggests that in order to achieve different learning outcomes, it *'requires a mix of pedagogical approaches'* (Prensky 2001; cited in Mac Keogh et al. 2010, p35).

In an online context, Anderson reports that *'a combination of online community and independent study activities'* is required to meet the learning outcomes, with *'an appropriate mix of student, teacher and content interaction (which) is uniquely designed for each learning outcome'* (Anderson 2009, p35; Mac Keogh et al. 2010, p35).

As can be seen from the case studies above, the approaches both to developing learning material, delivering the material, and assessing the learning achieved can vary widely, depending on the drivers behind the module design and lens of reflection in the research design.

Technology enhanced learning (TEL) is intrinsic in an online programme design through all virtual learning environments (VLE). *'Moodle'*, *'WebCT'* and *'Blackboard'* all form secure web-based LMS platforms from which to choose. The choices in technological delivery of learning material on these platforms is extensive and ever changing.

2.2.2.2 Pedagogical Approach

There could be a tendency in an online environment for a student to spend too long trying to digest new information in a passive sense, which would detract from their learning advancement. A suggestion would be to *'try to give the students something active to do at least every twenty minutes... the longer you lecture, the more of them you lose. Forcing them to be active, even if it's only for thirty seconds, breaks the pattern and gets them back with you for another ten to twenty minutes'* (Felder & Brent 1994, p103).

An active learning example would be to give formative assessment by way of setting *'multiple-choice questions /answers for feedback only. The addition of more formative assessment encourages a more student-centred approach'* (O'Neill & McMahon 2005, p31).

This example would then have multiple purposes. It can break up a section of learning and invoke a student-centred constructivist strategy in the online module design by giving formative feedback, while assessing the depth of learning achieved and slowing-down or regulating the new learning covered.

Professor Barrett's studies objectify the *'sensory impacts of learning'* (Anon n.d.). Multi-sensory learning at a basic level encapsulates five modes of sensory input and output, namely visual, audio, taste, smell and touch (Pediapolis n.d.).

'Multimodal... analysis of visual, aural, embodied and spatial aspects of interaction and environments' has been explored in HE research. Learners can be directed through multiple modes used to make sense of learning, including, but not limited to *'visual, spoken, gestural, written, three-dimensional'* modes (Bezemer 2012). This can be extended to online learning as well through social constructive pedagogy and strategic assessment methodology. For example, an assessment could be set to upload a video clip of the learner discussing their assignment and then it is peer-reviewed by their mentoring circle.

One significant advantage of online learning in comparison to a classroom setting is that experts can be included from any part of the world and either streamed-live or else pre-recorded and uploaded online to the LMS.

Expert lecturers and key note speakers will be able to give more rich, diverse information and depth of perspective than perhaps the lecturer (or team of lecturers) who are developing the online module. If this can be facilitated with an online question and answer session with the expert lecturer, it will engage learners and integrate deeper levels of learning.

'Many hands make light work, according to the proverb. But only if all those hands actually do some work. To be successful, online communities need the people who participate in them to contribute the resources on which the group's existence is built' (Kraut & Resnick 2011, p21).

Moore explored three types of interaction in the distance education environment, namely *'learner-teacher; learner-content; and learner-learner'* (Moore 1989; cited in Garrison & Cleveland-Innes 2005, p134). Learners need to interact in an online community as well as with lecturers and expert lecturers, to develop a sense-of-place and sense-of-belonging online.

Vygotsky refers to the *'Zone of Proximal Development (ZPD)'* where by the very nature, learners interaction with each other will enhance the learning achieved (Vygotsky 1934; cited in Carlile & Jordan 2005, p22; Carlile et al. 2004, p20).

This ties in with social constructive pedagogical approaches to learning and teaching. The *'Implications of social constructivism in practice'* could include the following suggestions for online development:

- *'encourage team working and collaboration*
- *Promote discussion*
- *Involve students in project work*
- *Set up study groups for peer learning*
- *Show students models of good practice in essay writing and project work*
- *Know your students as people, develop relationships and build trust*
- *Be emotionally aware and intelligent*
- *Be explicit about your professional values and ethical dimensions of your subject'* (Carlile & Jordan 2005, p23).

There are opportunities for synergy and collaboration between experts in many areas, which will lead to excellence in knowledge, experience and learning achieved through online practices. This is in keeping with *'Russian psychologist Vygotsky (1934) (who) demonstrated the importance of others as learning mediators'* (Vygotsky 1934; cited in Carlile & Jordan 2005, p21).

Putting information together in this context, if facilitated by professionals in an open, collegiate sense, it will reap great rewards. French sociologist Foucault defined *'communities of practice... where*

knowledge is embedded in the activities, social relations and expertise of specific communities, whether these are scientific... or virtual' (Foucault 1975; Carlile & Jordan 2005, p23).

There is an opportunity to investigate public-academic partnerships in online learning and teaching, to take steps towards excellence in technological enhancement and developing practitioner-lead experts. Collaboration with industry and key stakeholders would further research and development in this area.

For example, 'app' designs and their implications would be beneficial to both a lecturer and a public sponsor. Similarly, software writers for such software-types which are suitable for educational purposes might be interested in collaborative projects to showcase their products and trial new applications in specific areas of education or research and development, for example.

A cautionary note was surmised by Mac Keogh et al *'in relation to the potential impact on academic workloads and the need to design approaches which enhance learning without placing undue demands on the lecturer's workload'* (Mac Keogh et al. 2010, p35). This is relevant in the context of online practices, which invariably needs to be front-loaded, but also reasonable expectations of time requirements to facilitate online teaching, answering forum questions and mediating queries from students.

2.2.2.3 Conclusion from Extrinsic and Intrinsic Factors

Online learning can use TEL to develop learning material to meet strategic learning outcomes for a module, perhaps with different pedagogical approaches, depending on the specific requirements. Social constructivist pedagogy is ideally suited to an online learning and teaching platform, with opportunities for regulation of delivery, formative feedback, student centred choices and discussion groups, for example. Team delivery, inclusion of expert keynote addresses, public-partner opportunities and student-led input into content delivery are all areas for further research which, if included, will enhance the online learners experience and depth of knowledge attained.

3.0 Primary Research

3.1 Student Survey Findings

Online student survey responses are indicated in Table 3.0 below. The range was spread out between all years from all four programmes in the Department, illustrated in Figure 1.0 below. It should be noted that third and fourth year in every programme have smaller class sizes than first and second year.

Year / Programme	Numbers of students surveyed	Response numbers	Percentage representation
Architectural Technology	50	22	44%
Construction Economics and Quantity Surveying	74	18	24%
Construction Management	94	5	5%
Civil Engineering	99	5	5%
Sustainable Building Technology	2	0	0%
MSc Environmental Resource Management	0	N/A	-

Table 3.0 Student Survey Response Rates

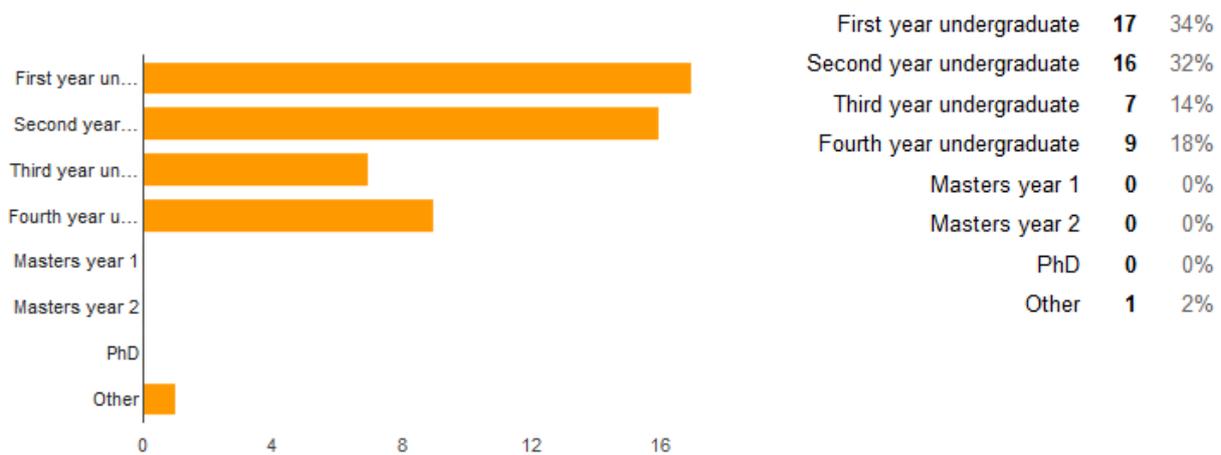


Figure 1.0 Undergraduate response to: which year are you attending in 2015-16?

The online survey questions were posed as a critical inquiry *'aimed at informing educational judgements in order to improve educational action'* (Bassey 1999; cited in Mack 2010, p10). When designing survey questions, I kept questions generally related to teaching, with no emphasis on online learning, in the interests of an *'openness towards education... (and) an emphasis on emergence'* (1993; cited in Cohen et al. 2011, p36), in keeping with my methodological stance. I hoped to get students *'point of view'* from within their social constructs, in keeping with my epistemological stance (Bryman 2012, p30).

My objective when surveying students was to see how best to get them involved. *'The challenge for you, as facilitator, is to provide a motivation and will to learn in order to influence this cycle'* (Carlile & Jordan 2005, p23).

49% of students were willing to be part of a trial to test new teaching material, illustrated in Figure 3.0 below. 33% were undecided.



Figure 3.0 Students response to: would you be willing to be part of a trial to test new teaching material?

Probed further as to what might encourage them to participate, the findings suggest that rewards such as mandatory or extra credits, being given time to participate and personal interest would be the main motivation. Findings are included in Table 4.0 below.

Student number	Response
P=3	'Primarily for my personal development. To become more competent and better specialist'
P=4	'Learning about technology'
P=5	'As long as the work revolves around the trial. If it was a side test then it might be too much when the workload is pretty large as it stands'
P=6	'I have a strong interest in it'
P=8	'If I can spare the time I would be glad to'
P=9	'I feel by doing this will help my learning'
P=11	'Extra Credits or recognition'
P=13	'I will do my final assignment at my university in Brazil'
P=19	'Extra credits'
P=21	'If there was more time to do so'
P=22	'I like getting involved in projects'
P=21	'If there was more time to do so'
P=22	'I like getting involved in projects'
P=27	'Extra credits'
P=32	'To gain a better understanding'
P=34	'Learn more about the topic'
P=38	'Broaden my knowledge'
P=43	'Cash'
P=47	'If the trial did not hinder current curriculum or was given merit in some way'

Table 4.0 Student's feedback on ways to encourage them to participate in a new module.

62% of students who engaged with the survey were interested in an in-class presentation, rather than an online module. 54% requested visits to Architectural buildings of merit, 52% wished to visit construction sites, 46% were interested in laboratory experiments and 42% were interested in project-based learning. It is very interesting to note that all suggestions relating to online learning (6-14%) or social media (8%) received the lowest percentages of support. Findings are included in Figure 4.0 below.



Figure 4.0 Students response to: How would you choose to learn more? Please choose as many options as you see fit from the list or add your own.

3.2 Staff Survey Findings

3.2.1 Interview with Management Representative

With this interview I hoped to explore opportunities for online module development. I chose to use an unstructured interview in keeping with a phenomenological observational stance, where I would aspire to interpret *'human actions and their social world from their point of view'* (Bryman 2012, p30) within a critical theory backdrop in order *'to improve educational action'* (Bassey 1999; cited in Mack 2010, p10).

An agreement was made that in order to further my research at GMIT, I could develop an elective module which I could then use as a pilot to trial online techniques to assess whether greater levels of learning have been attained.

The interviewee thought that an online module would be good idea as it would free up students' time to study when it was convenient to them. Students on the campus are struggling to find space to study between classes and generally have full timetables, five days a week. This option could reduce students' required contact time on-campus.

3.2.2 Interview with Researcher

I subsequently interviewed an active researcher, using a semi-structured interview technique, in order to give the discussion some focus. The interviewee suggested that the topic area was too broad and that for a thesis I would need to pick a smaller focussed area and pilot that instead. I noted that I chose to go broad with this feasibility study for initial research purposes, in keeping with my epistemological and methodological choices.

They also suggested that I would need to consider doing a normal class or laboratory experiment, for example, and then teach the same class online and compare the outcomes from both to do this type of research. Having since read case studies detailed in the literature review, I feel that there are numerous other ways to assess the success or failure of the depth of learning, understanding and metacognition achieved through online practices.

I questioned whether there might be scope for postgraduate online module development, but the interviewee felt that this would not go ahead in GMIT as *'we might not have postgrads at all'*. They had concern that I might not get enough participants to trial an online module. This is an ongoing concern.

3.2.3 Interview with Academic

I chose to do a structured interview by e-mail as the interviewee was based on a different campus. They concurred with the researcher on some points. *'The title ... is too broad. It is potentially a vast area and it would need to be fine-tuned to a) let potential students know what is on offer and b) attract students'*.

The interviewee agreed with the students in terms of scope for learning: *'Yes, understanding ... is constantly developing and these developments need to be disseminated ... at all levels, and online (or e-learning) is an ideal medium for this'*.

The interviewee disagreed to some extent with the researcher as they considered that the suggested topic area would be suitable at undergraduate and postgraduate level.

3.2.4 Interview with Learning and Teaching Management Representative

The interviewee considered that *'money - funding, resources and support'* was the principal obstacle we are facing in relation to development online learning at GMIT. *'We don't have a model in this Institute in relation to the online learning space. We have a classroom-based contact-hours culture'*.

'We need an online learning policy in this Institute. We have to look at flipped classrooms in more detail. Online learning needs to be introduced gradually. It is all in the instructional design and how it is presented on the students' learning journey'.

Strategies such as *'80% participation linked to passing the module'* could be an acceptable way of managing engagement in online material, for example. Similar to the academic interviewee, this interviewee suggested that online participation can be monitored using *'Moodle'*.

The interviewee suggested that the approach with first years would be different to postgraduates, in that the pedagogical approach would need to be paired to the audience's needs. They also suggested that, for example, *'five flipped sessions could be taught and then assignments set on them'*.

The interviewee was open to the idea of sending out an invitation for expressions of interest to alliancing partners in order to gain participants in an online module trial, for example, although participants would need a GMIT registration to be able to access the module on *'Moodle'*.

Since this interview, the Teachers Union of Ireland (TUI) have issued a directive ban on any members getting involved in anything relating to the TU or HE mergers while the TU Bill is contested (Anon 2015), so this will not be possible at this current time.

3.3 Conclusion from Primary Research

My conclusion from the student survey responses is that they are very practical-orientated and are interested in learning through traditional methods in classrooms and active learning through laboratories, site visits, material samples and experiential learning. Perhaps an online learning platform might not suit the students attending this department who are enrolled principally in vocational, practical programmes. It might be the case that this is all they are familiar with and so find it more comfortable to advocate this approach rather than a fully-online module design.

About half of those who responded to the survey said they would be willing to participate in a trial module. Suggestions such as including it in mandatory credits, giving a reward of extra credits, being given time to participate and personal interest would be their main motivators.

Based on the student survey findings, there seems to be an expression of interest among some undergraduate students at this time. However, with the best of intentions, not all of these would begin the module and even fewer participants would finish it. In my opinion, learners would need to finish the module in its entirety in order to assess the level of learning achieved.

Getting numbers to trial an online module will warrant significant consideration if planning a larger research proposal. Perhaps at that stage, there will be opportunities to explore this with other CUA partner programmes. Certainly, IT Sligo already has extensive online and e-learning capabilities, which would be a great resource to access and as an alliancing partner, I would then be in a position to check that I am not replicating learning material they have already produced.

It is worth noting also that students participating in a classroom setting will all know each other and then enrol in an online module. It may have an added dynamic which will not be reflective of pure online learning. Thus research findings will be different to that investigated in case studies as part of the literature review in this research. It would certainly make the transition easier if they already know each other from their other classes.

Professional stakeholder surveys were outside of the scope of this feasibility study but it would be interesting to review at a later stage. It would certainly increase numbers participating and module design, in this instance, could be based on a purely-online pedagogical approach.

4.0 Overall Conclusion

There is great scope for the development of teaching material online at undergraduate, postgraduate and professional levels. This feasibility study has outlined options for assessing deeper levels of understanding and learning online, pedagogical approach as well as extrinsic and intrinsic factors which may or may not influence greater metacognition. Team delivery, inclusion of expert lecturers and collaborative partner opportunities with industry are also areas for further research investigation.

Using an online pedagogical approach, including blended learning and flipped-classroom approaches, is a significant change and paradigm shift in the HE landscape in Ireland. Management of this change will require leadership by way of a publication of an online learning policy and examples of best practice will need to be pursued at an Institutional level.

Online module design could be geared to assess a number of initiatives outlined in this feasibility study at the same time. From this, parallel research streams could generate data in a number of areas of investigation. Research findings could thereafter be used to inform or update online policy documentation or be used towards the publication of a best-practice guide on online learning for educators and learners alike.

References

- Anderson, T., 2009. Towards a theory of online learning. In *The theory and practice of online learning*. Athabasca: Athabasca University Press, pp. 45–74.
- Anon, Beginners Tai Chi.com Learn Tai Chi the fast and easy way. Available at: <http://www.beginnerstaichi.com/>.
- Anon, 2015. *Bille na nOllscoileanna Teicneolaíochta, 2015 Technological Universities Bill 2015*,
- Anon, Improved Learning Through Classroom Design | Business | University of Salford, Manchester. Available at: <http://www.salford.ac.uk/business/consultancy/case-studies-nightingale-schools> [Accessed December 3, 2015b].
- Anon, 2016. Learning Theories Constructivism - Learning Theories. Available at: <http://www.learning-theories.com/constructivism.html> [Accessed February 15, 2016].
- Anon, MentorMatchMe - News. Available at: http://www.ciat.org.uk/en/media_centre/news_and_events/index.cfm/menmatchme#.Vk8LxL_zk3d [Accessed November 20, 2015c].
- Bassey, M., 1999. *Case study research in educational settings*., Buckingham: Open University Press.
- Bernstein, B., 1971. On the classification and framing of educational knowledge. In M. Young, ed.

- Knowledge and Control*. Basingstoke: Collier-Macmillan, pp. 47–69.
- Bezemer, J., 2012. What is Multimodality? *UCL Institute of Education*. Available at: <http://mode.ioe.ac.uk/2012/02/16/what-is-multimodality/> [Accessed March 1, 2015].
- Bryman, A., 2012. *Social research methods* 4th ed., Oxford; NY: Oxford University Press.
- CAO, 2016. CAO. Available at: <http://www.cao.ie/courses.php>.
- Carlile, O. & Jordan, A., 2005. It works in practice, but will it work in theory. The theoretical underpinnings of pedagogy. *Emerging Issues in the Practice of University Learning and Teaching*, pp.11–26. Available at: http://www.aishe.org/readings/2005-1/carlile-jordan-IT_WORKS_IN_PRACTICE_BUT_WILL_IT_WORK_IN_THEORY.html.
- Carlile, O., Jordan, A. & Stack, A., 2004. *Learning by Design: Learning Theory for the Designer of Multimedia Educational Materials.*, Waterford: WIT / BBC Online.
- Chakraborty, M. & Nafukho, F.M., 2014. Strengthening student engagement : what do students want in online courses ? *European Journal of Training and Development*, 38(9), pp.782 – 802.
- Charmaz, K., 2014. *Constructing Grounded Theory*, London, Thousand Oaks, New Delhi: SAGE. Available at: <http://www.uk.sagepub.com/books/Book2...>
- Cohen, L., Manion, L. & Morrison, K., 2011. *Research methods in education* 7th ed., Oxon; NY: Routledge.
- Collins, A., Brown, J. & Holum, A., 1991. Cognitive apprenticeship: Making things visible. *American Educator*, 6, pp.38–46.
- Creswell, J.W., 2007. Understanding mixed methods research. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 11(2), pp.1–19. Available at: <http://www.amazon.com/dp/1412916070>.
- Darwin, A., 2000. Critical reflections on mentoring in work settings. *Adult Education Quarterly*, 50, pp.197–211.
- Darwin, A. & Palmer, E., 2009. Mentoring circles in higher education. *Higher Education Research & Development*, 28(2), pp.125–136.
- Doll, W.E., 1993. *A Post-Modern Perspective on Curriculum*, NY: Teachers College Press.
- Donnelly, R. (DIT), Harvey, J. (DIT) & O'Rourke, K., 2010. *Critical Design and Effective Tools for E-Learning in Higher Education*, Available at: <http://www.myilibrary.com?ID=265933>.
- Felder, R.M. & Brent, R., 1994. Effective Teaching. *Chem. Engr. Education*, 28(2), pp.108–109.
- Foucault, M., 1975. *Discipline and Punish: The Birth of the Prison*, London: Tavistock.
- Freire, P., 1973. *Pedagogy of Oppressed*. In NY: Seabury Press.
- Garrison, D.R. & Arbaugh, J.B., 2007. Researching the community of inquiry framework: review, issues and future directions. *Internet and higher education*, 10, pp.157–172.
- Garrison, D.R. & Cleveland-Innes, M., 2005. in Online Learning : Interaction Is Not Enough. *American Journal of Distance Education*, 19(3), pp.133–148. Available at: <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Facilitating+Cognitive+Presence+in+Online+Learning:+Interaction+Is+Not+Enough#0>.
- GMIT, 2013. *Academic Code, of practice No 2 Monitoring and review*, GMIT. Available at: http://www.gmit.ie/sites/default/files/public/directorate/docs/code-practice-no2_1.pdf.

- GMIT, 2015. Connacht-Ulster Alliance gets go-ahead to work towards becoming a Technological University | GMIT. Available at: <http://www.gmit.ie/news/connacht-ulster-alliance-gets-go-ahead-work-towards-becoming-technological-university> [Accessed November 22, 2015].
- GMIT, 2016a. First Year Advice. Available at: <http://www.gmit.ie/general/first-year-advice> [Accessed March 1, 2016].
- GMIT, 2016b. History. Available at: <http://www.gmit.ie/directorate/history>.
- Greene, J., Caracelli, V. & Graham, W., 1989. Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*, 11(3), pp.255–274.
- Gregori, E., Torras, E. & Guasch, T., 2012. Cognitive attainment in online learning environments: matching cognitive and technological presence. *Interactive Learning Environments*, 20(5), pp.467–483. Available at: http://apps.webofknowledge.com/full_record.do?product=WOS&search_mode=GeneralSearch&qid=334&SID=N2eZIGPBS3HXDU25Eoo&excludeEventConfig=ExcludeIfFromFullRecPage&page=1&doc=3.
- Mac Keogh, K. et al., 2010. Designing Online Pedagogical Techniques for Student Learning Outcomes. In *Critical Design and Effective Tools for E-Learning in Higher Education*. pp. 22–38.
- Kolb, D.A. & Fry, R., 1975. Towards an applied theory of experiential learning. In C. Copper, ed. London: John Wiley.
- Kraut, R.E. & Resnick, P., 2011. Encouraging contribution to online communities. *Evidence-based social design: Mining the social sciences to build successful online communities*, pp.21–76.
- Li, J.X., Hong, Y. & Chan, K.M., 2001. Tai chi: physiological characteristics and beneficial effects on health. *British journal of sports medicine*, 35(3), pp.148–156.
- Mack, L., 2010. The Philosophical Underpinnings of Educational Research. *Polyglossia*, 19, pp.5–11. Available at: http://www.apu.ac.jp/rcaps/uploads/fckeditor/publications/polyglossia/Polyglossia_V19_Lindsay.pdf.
- Marks, P.Z. et al., 2014. “I gained a skill and a change in attitude”: A Case Study Describing How an Online Continuing Professional Education Course for Pharmacists Supported Achievement of Its Transfer-to-Practice Outcomes. *Canadian Journal of University Continuing Education*, 40(2), pp.1–18.
- Marx, G., 1997. Of Methods and Manners for Aspiring sociologists: 37 Moral Imperatives. *The American Sociologist*, 28, pp.102–125. Available at: <http://www.springerlink.com/index/W6U78663J5M77956.pdf>.
- Moore, M.G., 1989. Three types of interaction. *The American Journal of Distance Education*, 3(2), pp.1–6.
- O’Neill, G. & McMahon, T., 2005. Student-Centred Learning: What Does it Mean for Students and Lecturers? *Emerging Issues in the Practice of University Learning and Teaching*, pp.27–36. Available at: <http://www.aishe.org/readings/2005-1/>.
- Pediapolis, W.K., The 5 Senses. Available at: http://udel.edu/~bcarey/ART307/project1_4b/.
- Prensky, M., 2001. *Digital game based learning*. New York: McGraw Hill.
- Pring, R., 2000. *Philosophy of educational research* Continuum., London.

- QQI, Irish National Framework of Qualifications (NFQ). Available at: <http://www.nfq-qqi.com/index.html> [Accessed March 3, 2016].
- salehi, A., 2013. Objectives and Principles of Education from Critical Theorists POVs. *Procedia - Social and Behavioral Sciences*, 89, pp.49–53. Available at: <http://www.sciencedirect.com/science/article/pii/S1877042813029388>.
- Salehi, A. & Mohammadkhani, K., 2013. The School Curriculum as Viewed by the Critical Theorists. *Procedia - Social and Behavioral Sciences*, 89, pp.59–63. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S1877042813029406>.
- Selwyn, N., 2015. Learning, Media and Technology. *Learning, Media and Technology*, 40(1), pp.64 – 82. Available at: <http://www.tandfonline.com/action/journalInformation?journalCode=cjem20>.
- Stehle, S., Spinath, B. & Kadmon, M., 2012. Measuring Teaching Effectiveness: Correspondence Between Students' Evaluations of Teaching and Different Measures of Student Learning. *Researching Higher Education*.
- Thomson, P., 2013. methodology isn't methods... or ... what goes in methods chapter. Available at: <http://patthomson.net/2013/02/18/methodology-isnt-methods-or-what-goes-in-a-methods-chapter/> [Accessed December 1, 2015].
- Trowler, P., 2015. *Ten Key Components of Doctoral Research: Maximising Alignment and Significance*,
- Vygotsky, L., 1934. *Thought and Language*, Cambridge Mass: MIT Press.
- Yilmaz, K., 2013. Comparison of Quantitative and Qualitative Research Traditions : epistemological , theoretical, and methodological differences. *European Journal of Education*, 48(2), pp.311–325.