Community Engaged Research and Learning (CERL): a transformative approach to education

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REFLECTIONS

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Editorial

In this special edition of Reflections, we share the learning of a range of colleagues from within Queen's and other European institutions who participated in Circlet, an Erasmus+ Strategic Partnership Project. In the articles, the writers reflect on the concept of Community Engaged Research and Learning (CERL), as well as on how we worked in the project – through our peer-learning circles, where academics were able to trial and share experiences, and through our innovative online accredited module.

The project was co-ordinated by The Science Shop at Queen's. Within Queen's, 13 academics took part in the learning circles and two completed the module. In this publication, David Cutting from Computer Science, Gareth Tribello from Mathematics, Maeliosa McCrudden from Biomedical Sciences and Suzanne Russell from Dentistry all share their experiences of working with communities to design and deliver student research projects.

In addition, consortium partners from CIRCLET share some of their work and learning in the project. Linde Moriau of Vrije Universiteit Brussel offers her perspective on the value and importance of community engaged research and learning. Drs Caroline McGowan, Catherine Bates and Sinead McCann, Technological University Dublin share their learning from running CIRCLET's online module whilst Dr Réka Matolay, Márta Frigyik, Dr Judit Gáspár and Dr Andrea Toarniczky, from the Corvinus University of Budapest describe their experiences in designing and running the project's Learning Circles.

The project also produced a range of resources which we invite you to dive into, including 'how to' reports from all of our activities and case studies from other partner universities. Full details on all of these activities are available on the CIRCLET website **www.circlet.eu**

If you are interested in exploring a community engaged research and learning project for your students, please contact us in the Science Shop – **science.shop@qub.ac.uk** for more information.

Dr Emma McKenna
Guest Editor

Curriculum Innovation through Research

CIRCLET Partner logos

Between 2019-2022, QUB Science Shop co-ordinated an Erasmus+ Strategic Partnership Project called *Curriculum Innovation through Research with Communities: Learning circles of Educators and Technology* – CIRCLET. This project focused on developing academic skills to redesign their modules for community engaged research and learning (CERL).

Through the CIRCLET project, more than 3000 students and 104 academics from Queen's University Belfast, Corvinus University Budapest, Technological University Dublin, Universitat Oberta de Catalunya and Vrije Universiteit Brussel learned about and participated in CERL projects.

CIRCLET Consortium Belfast 2019

The Science Shop: brokering Community Engaged Research and Learning Projects at Queen's

Examples of our community partners in 2023

By Dr Emma McKenna and Eileen Martin, The Science Shop at Queen's


Eileen Martin, Lynsey Davis and Emma McKenna

The Science Shop at Queen's acts as the main broker for Community Engaged Research and Learning (CERL) projects in Queen's University Belfast, working through the academic curriculum to broker and complete around 60 projects a year. Between 2019-2022 (during the COVID pandemic), we worked in 13 of the University's 15 Schools, across 63 academic pathways at undergraduate and taught masters levels. This included working directly with 830 students and offering tailored opportunities to 2,747 students. Over 170 projects were completed on behalf of 88 community organisations right across Northern Ireland, including 32 new partners. A significant part of the work is creating a fit between research needs emerging from communities and academic disciplines and courses.

In recognition of their excellence in collaboration at both European and local levels, the QUB Science Shop has recently been announced as the first team in the university to receive the prestigious Advance HE Collaborative Award for Teaching Excellence.

How we work

In the first instance, we work with community partners to design research projects appropriate for students to carry out as part of their degree. Organisations vary considerably in their research capacity and awareness, and in the time they have available to devote to research. So initial scoping normally involves visiting the organisation to understand their area of expertise and their goals for the research, alongside their working methods, interests and skills. This helps set expectations when students and academic staff become interested in working with an organisation. After this meeting, we write up small-scale research project ideas for review by the partner organisation. The focus is on ideas that are important rather than urgent as it is normally not possible to deliver on urgent research needs through the cycle of the academic year. Once agreed, 2-line project titles are made available on **The Science Shop website**.

The next phase of the work is working with academic module co-ordinators. In some cases where we know the academic area we are happy to provide a shortlist of projects for discussion. In other cases (especially if it is a new, or new to us course) it is useful to have an initial meeting where we get to know the goals of the module and the boundaries of the disciplinary area. The module co-ordinator always makes the final decision on which projects are offered to students since they have the best overview of what will work for their own course. In order to make that decision, module co-ordinators often want more information about the community partner(s), how they work and the specifics of the research needed, to ensure that the project will meet the learning outcomes for the module and will utilise prior teaching the student(s) have had in terms of topic areas and research methods. We strongly lean into the expertise of our academic colleagues to (re)shape the research needs into projects relevant for their discipline. This academic underpinning ensures that the project will meet the learning outcomes for the module.

In many cases, we also work directly with students. We are happy to go along to a lecture to outline a range of projects and explain how the process works – we can do this in less than ten minutes or we can talk to students for an hour according to what suits. If a student (or group of students) is considering opting for one of our projects, we are available to meet with them to talk it through. This helps them unpick their motivations for doing the project, understand what they will learn from it, and interrogate how they will approach it and shape it, all in the context of their disciplinary area and learning preferences, and the needs of the partner. We also help to prepare students for a first meeting with the community partner and attend the meeting with them, modelling/mentoring how the process works; academic supervisors are very welcome to attend this meeting if they want to. We maintain ongoing contact with the student(s) and organisation for the lifetime of the research project, ensuring that they are adequately supported. We also take care of project evaluation and are keen to participate informally in module review and reflection.

How to contact us

We always have many more project ideas available than we have students to complete them and are keen to work in new academic areas, so please contact us if you would like to explore the possibility of your students doing a CERL project. We have a full list of our currently available projects on our website **www.qub.ac.uk/scishop** which will give you some idea of the range of organisations we work with. Please email **science.shop@qub.ac.uk** if you would like to discuss further.

Can We Embed SDGs in Mathematics Education?

By Dr Gareth Tribello, School of Maths and Physics

Community-engaged research and learning (CERL) involves students working with community partners on collaboratively-defined, real-life projects, within the curriculum, for mutual benefit. In the UK, these community-based projects are commonly used in social work, nursing, management and geography. However, completing projects of this sort is less common in chemistry, physics and mathematics. For the last two years, I have been involved in the CIRCLET project and trying to change this by embedding a community-engaged research project in one of the modules in the mathematics degree at Queen's. In this reflective article, I will first explain why embedding these projects is essential. I will then talk about how I manage these projects in my module before finishing by reflecting on the strengths and weaknesses of my approach.

The purpose of STEM education

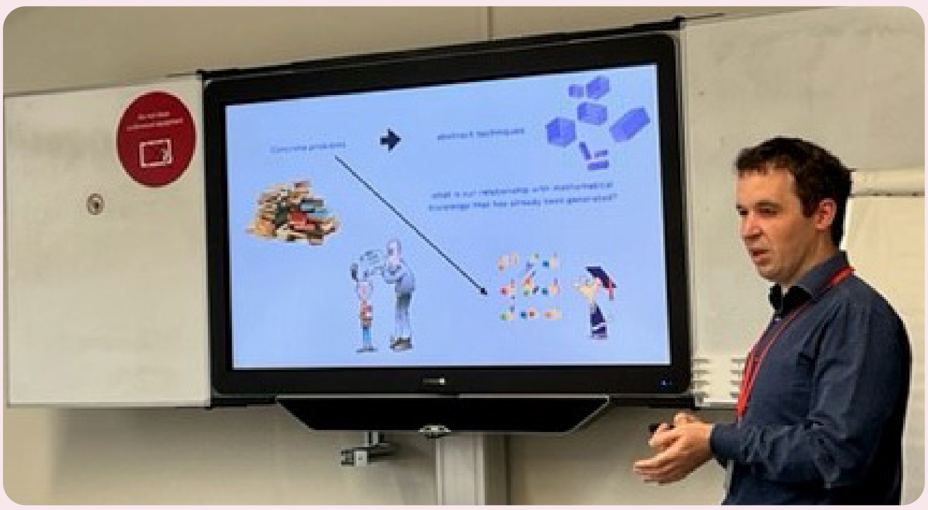
When I transitioned from learning during my undergraduate degree to doing research at the end, I was struck by how little preparation for research the previous three years had given me. During my undergraduate degree, I was given no guidance on reading, reviewing or writing a scientific paper. I was not shown how to search a body of literature on a topic and synthesize it by writing an essay. I had not even been taught how to write a computer program. Instead, I spent the previous three years developing an "understanding" of a body of abstract theory that was, at best, superficial.

I find that the only effective way of understanding something is to engage with it using tools I have learned by doing research. In other words, I learn by working through concrete tasks like producing syntheses of topics by making notes based on multiple resources or by setting myself programming challenges. Given how essential this concrete experience is to learning, only an egomaniac would imagine they can get students to understand abstract theory by explaining it. Students need time and space to design and complete investigations similar to mine. Our role as teachers is to guide students through these investigations so they can more quickly arrive at the point of understanding.

I have seen how CERL motivates mathematics students to pursue investigations that lead to learning. Community partner participation ensures that students are doing work that has a higher purpose than simply achieving some teacher-defined threshold. Furthermore, these projects force teachers and students to consider why and how abstract ideas can be translated into real-world outcomes. Obviously, this means there is a potential for impact and work that addresses the Sustainable Development Goals (SDGs). In my mind, however, it is more important to recognise that by embedding CERL in mathematics teaching, we can broaden the range of people who are participating in informed debates about how disruptive ideas from research, such as machine learning, are used to address the SDGs. These debates potentially benefit the users of these new technologies and their developers equally by democratising processes through which they are adopted by society.

What I do in my module

I teach a level three mathematics module on stochastic processes and risk to approximately 20 students. For the



last two years, one of the assessments for this module has been a report that students complete in partnership with a rural transport charity. Students use what they have learned in the module to design and execute a project where they model transportation in County Fermanagh. Before tackling this project, the students complete six mini-projects introducing them to the module curriculum. An online course of videos and automatically-marked programming exercises supports these projects. They also learn about the particular transport challenges rural communities face through discussion sessions with the CEO of the rural transport charity (Jason Donaghy) and with a colleague from the School of History, Philosophy, Politics and Anthropology (Prof John Barry) that take place in the seventh week of the semester.

Students are strongly encouraged to develop research questions, although I also provide a bank of example problems they can choose from. I give them the freedom to work independently or in groups and to work through the module at their own pace. The only deadlines I set are the ones that are essential for ensuring that marks can be prepared on time for exam boards. I have found this process of recommending rather than insisting on particular deadlines very liberating. This flexible structure allows me to identify and support struggling students during the weekly two-hour computer class for the module. The best method for providing support I have found is to sit with individual students and ask them why they have not completed more of the work that has been assigned and then offer them individually-tailored guidance on the next steps to take.

Strengths and weaknesses

For me having students working with community projects has been transformative. I have been pleasantly surprised by the quality of the work that ALL students produce and the novelty of their research ideas. The community partner has commented that the students' work is rigorous, shows respect for the discipline and demonstrates a real understanding of the transport challenges that rural communities face. I have learned new things and feel engaged in co-learning with the students.

Despite the successes, however, there are still difficulties because these projects challenge the prevailing narratives about the purpose of

universities and education in general. Students, colleagues, and even I, have been conditioned to believe that you obtain expertise from education and only then use that expertise to affect real-world change .This narrative makes it is difficult to find a sympathetic ear for the alternative paradigm of "learning by experience" that I outlined in the CERL in STEM section of this article.

Although no one would ever articulate it in these terms, in both our students and our imaginations, education has become a kind of initiation ritual that students must complete to participate more fully in society. I thus hear concerns from colleagues such as, "How do you know that the work the students are producing is correct?" There is also an unwillingness to recognise the sense of pointlessness students might feel from doing projects where the teacher knows the correct solution at the outset. A student completing such a task knows they can, at best, reproduce work that has already been completed but are more likely to produce an incomplete account of something already known.

My learning

On reflection I recognise that, even though I have tried to reject paternalistic approaches to education, there is still an element of it in the way I have designed my module. I insist that students spend six weeks studying the module content before meeting the community partner. I have also only ever sent the community partner a tiny subset of the student reports to read. Having taught the module in this way twice, I now have more confidence to give the community partner more choice about their role. I also have the confidence to let students choose what theory to study once they have designed the research questions for their projects. I mention all this to highlight how developing working relationships with community partners and learning how to support students to complete this type of work during a 12-week semester takes considerable time.

Student feedback

Multiple students have commented that they felt passionate about the project work they completed for modules involving these community-engaged projects. One even commented that "my project for this module is what I work on when I want to avoid working on more boring work I have to do for other modules." She then questioned why she had not felt this same passion for other work she had to do in her degree. In other words, even our students recognise that these projects provide them with a creative outlet, which is absent in much of the "ritual" work they must complete for other parts of their degree.

Concluding thoughts

Even though the aim is to get students to engage creatively, there is a delicate balance to strike here. If they are to have marks, students need to be told what good work looks like, which diminishes the scope for student creativity by necessity. Recognising that the valuable things students take away from education are the positive experiences of learning by doing meaningful work helps enormously. These creative experiences are the things they will discuss on job application forms and in job interviews. This recognition is what motivates me. I enjoy how CERL projects disrupt the normal relationships between teachers, students and society, and humanises everyone involved. I genuinely enjoy the sense of solidarity with students that permeates this module's classrooms and hope that it is something that I will be allowed to continue experiencing for the rest of my career.

Weaving Community Engaged Research and Learning (CERL) into the Biomedical Science and Human Biology curricula: a personal reflection

By Dr Maeliosa McCrudden, formerly Centre for Biomedical Sciences Education, School of Medicine, Dentistry and Biomedical Sciences and presently Research Strategy and Engagement Team in the Research and Enterprise Directorate.

Dr Maeliosa McCrudden

In the academic year 2020-2021, in my role as Teaching Associate in the Centre for Biomedical Sciences Education, I was responsible for the curation and supervision of a final year research project, to be undertaken by one undergraduate student on the BSc. Biomedical Science or BSc. Human Biology programmes of study. Although I approached this with a wealth of experience, having supervised laboratory-based project work, this was the first project I had devised from first principles, as it were. In a fortunate twist of fate, I had approached colleagues in the QUB Science Shop earlier that same year to inquire about opportunities to embed community engaged research and learning (CERL) into my teaching and had consequently enrolled on the CIRCLET project. This is where, for me, two worlds collided, in a most fortunate and fulfilling way. Allow me to elaborate.

Imparting meaning

A recent conversation with an astute colleague has helped me to understand what the common theme in my entirely non-linear career trajectory has been: imparting meaning. This theme has evolved over time. Initially, this meaning was imparted onto me by teachers, lecturers and colleagues, but subsequently I hope this meaning has been imparted by me onto others.

It was the teaching on one of my final year Biochemistry modules, "Molecular mechanisms of disease", that left the most indelible mark on me. The need to understand how disease "works" and how we can treat patients resulted in my decision to undertake a PhD and then spend over 11 years actively researching disease processes. Through aligned, patient-focused work with colleagues in international non-profit organisations such as PATH, and national partners including RCUK and the National Coordinating Centre for Public Engagement (NCCPE), my work held a true sense of purpose, through stakeholder and patient engagement. I was helping to make a difference. Embarking on my teaching career, it was my intention to impart some of that same sense of meaning onto the students. I found the opportunity and scope to do this through the provision of a student-led, community engaged final year research project.

The research project module

As with many other final year programmes of study, the BSc Biomedical Science and BSc Human Biology programmes at QUB include a capstone/dissertation module, providing students with the opportunity to undertake a substantial piece of scientific project work. The module presents an introduction to fundamental research, allowing students to develop their capacity for independent, analytical and critical thought. The learning outcomes for the module are understandably broad, with one highlighting the ethos to "Show initiative and independent thought". Conventionally, projects are proposed by research investigators from within the various research centres and institutes of the Faculty of Medicine, Health and Life Sciences and are based on ongoing work within the relevant research laboratory. This work can be discovery, applied or clinical science-related, with all students undertaking the same core elements of the module, namely:

- Comprehensive written review of the topic
- Data collection
- Data analysis
- Dissertation and oral presentation

Therefore, as project convenor, the challenge for me was to detail a research question that would meet the learning objectives of the module, allowing the student to develop their inherent investigative capabilities, whilst also appealing to a student enrolled on a BSc. Biomedical Science or BSc. Human Biology programme.

CERL and the research project

Through an introduction to Cancer Focus Northern Ireland (NI), facilitated by Eileen Martin in the QUB Science Shop, we co-developed a project proposal "...to assess attitudes towards, and frequency of use of sun beds, tanning booths and tanning lamps in Northern Ireland, gathering public opinions on the potential banning of their use...", based on the needs of the charity. Importantly, the broad scope of the proposal allowed flexibility for the student who chose to undertake the project to shape it as they and the charity partner deemed appropriate. The project was undertaken by Daniel Crummey, a Biomedical Science student. Our project team consisted of Daniel, our community partner, Cancer Focus NI, my colleague, Dr. Samantha Taylor, who co-supervised the project with me, and myself as project supervisor.

Based on the ongoing public health guidance at the time, during the COVID-19 pandemic Daniel devised, in collaboration with Cancer Focus NI, an entirely online survey, for dissemination to the public via email and Cancer Focus NI social media channels. Data was collected (over the course of approx. 10 weeks), analysed and then compiled into the dissertation, with research findings presented and assessed at a formal presentation session to a panel of experts, including our Cancer Focus NI collaborators.

Impact of CERL

The positive impact of this CERL project must be articulated from three different perspectives; that of the researcher, the community partner and the educator.

The researcher

Reflecting on the personal impact this CERL project had on him, Daniel indicated that he had:

- *Greater sense of motivation knowing how my research could benefit my local community...my work counted for more than my dissertation.*
- *Raised an awareness of the importance of scientific research outside of the lab and clinic.*
- *Completely new type of research experience - Research beyond scientific papers and textbooks.*

It is testament to his commitment to the project that he was subsequently invited to present his research findings to an expert Cancer Focus NI working group and at the 9th Living Knowledge Conference in the Netherlands. Upon graduation, Daniel undertook postgraduate studies in Cancer Biology, and now continues to build his scientific career in academic research.

Community partner

Following on from the primary study, Cancer Focus NI commissioned a continuation project, to be undertaken in the next academic year (2021-2022), to explore specific outcomes of the primary study, thus acknowledging the value this CERL project had brought to them.

Educator

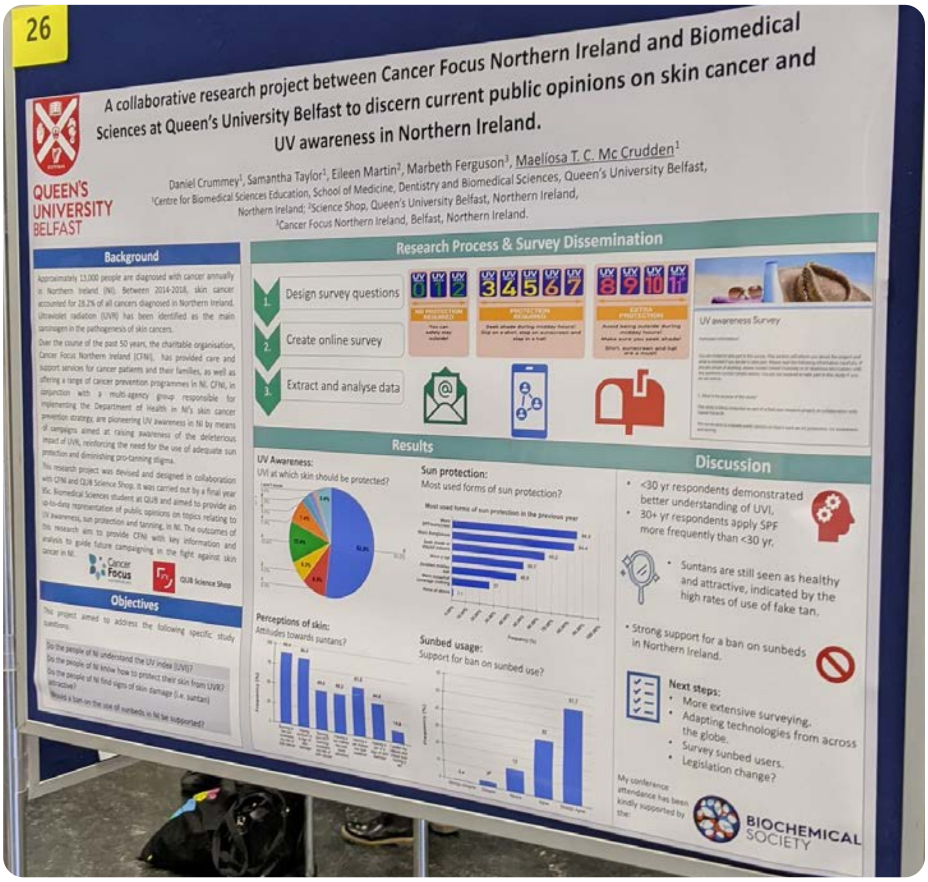
My approach to education focuses on enhancing the student experience through experiential learning, leading to tangible outcomes and informing values. The ethos and principles of CERL have allowed me to introduce this approach into the BSc Biomedical Science and BSc Human Biology programmes of study at Queen's University. But, I certainly feel that this is only the beginning.

How best can we prepare ourselves and our students for such "real life" learning experiences? My personal learning curve has indicated that we must:

- Embed in student learning an **understanding** of what it means to engage the public, patient groups, charitable organisations and the government with accurate scientific information.
- Encourage students to **communicate their biomedical science** research to the public, allowing them to consider appropriate and accurate dissemination of scientific data to audiences of diverse stakeholders.
- **Make time and space**, that often isn't readily available in busy teaching timetables, to plan, introducing key CERL concepts to colleagues on Learning and Teaching Committees very early in the process of establishing CERL partnerships.
- **Find our tribe** of CERL practitioners across the University and beyond – they are our support systems.
- **Find the fit** amongst the skills of the student, the specifications of the curriculum and the needs of the given community partner to allow CERL projects to be incorporated into the curriculum.
- Introduce students to the possibilities and benefits of CERL **early in their undergraduate learning**. This can only serve to enrich their university experience.

In committing to this early introduction of CERL to our students, in the subsequent academic year (2021-2022) I curated content on a new professional skills module for second year undergraduate students, focused on honing their inherent initiative, communication and interpersonal skills. Fittingly, public engagement with science and co-production of research proposals with community partners formed two central themes of this module.

Encouragingly, student feedback has been overwhelmingly positive. The onus, therefore, is now on us, as educators, to build upon that which we've started.



Authentic Learning: the real challenges of real projects

By Dr David Cutting, Electronics, Electrical Engineering and Computer Science

A challenge no doubt we all face, but seen acutely in the hands-on applied learning required for Software Engineers (the teams of people behind the curtain that build the apps and websites powering the modern world), is to deliver effective and authentic learning opportunities. A key component of these experiences for our students comes in the form of projects building up to the final undergraduate honours or masters dissertation project which acts as a keystone to demonstrate the application of their total learning as well as pushing students to self-directed research. As academics we spend considerable time generating and supervising projects, all with the aim of authentic learning and usually acting as some form of customer or consumer ourselves; we set the requirements and guide the decisions made.

An alternative approach, which can offer benefit to all, is to find a real "customer" or project sponsor to define the work. The sponsor gets benefit (work is done for no cost), the student gains a more authentic experience, and the academic, while still providing supervision, is freed up from having to define the problem area for the project. Traditionally, areas such as Software Engineering have offered some "industrial projects" where the sponsor is a commercial entity often themselves looking to raise their profile with future entrants into the employment market, but expansion into other sectors offers opportunity.

It was with this in mind that in 2019, building on my experience working within international development, I setup the Global Coders (**https://globalcoders.org**) initiative, matching masters students with international NGOs that had ideas for projects but little or no resource to undertake them. While running this programme with some success I was introduced to the Science Shop at Queen's, and through them the wider CIRCLET programme. It turned out what I was doing had a name, Community Engaged Research and Learning (CERL), and a lot of people far cleverer than me working to build and embed this practice.

Through the Science Shop, I was invited to take part in the CIRCLET International Learning Circle which was a great opportunity to meet with all sorts of colleagues interested in CERL, both as part of a local QUB "triad" of three academics, and in larger international sessions. It was both interesting and encouraging to see what challenges existed and the approaches used in diverse disciplines.

Following the CIRCLET sessions, I was working with other staff in our School who had been looking at how our final year Software Engineering module could be made to follow more authentic industry lines. This allowed us to work on community CERL projects with the students, with four student groups, made up of twelve students in total, choosing to work on CERL projects. Projects included a peace walk tour guide in association with The Corrymeela Community and a pet-focussed initiative with Doggy Dynamos.

Students worked in their small groups of 3-5, closely supervised by academic staff. They met at least once every fortnight making regular presentations on their progress throughout the academic year. Some student groups worked closely with the partner and the project output was usually better for this, however, naturally some partners had restrictions on the time they could put in and not all students needed to, or were able to, work very closely together with the community partner.

One aspect key to the success of an individual project is the academic role in translating community needs into a project that was suitable for the students, especially when working for the first time with clients who are not technology professionals. Academic staff took a key role in designing the projects and setting overall requirements before the students started working on them, aided greatly by our experience of this from previous work in consultancy and industry.

The students were excited by meeting the partner, and it enhanced their interest in the projects and helped tie in a key outcome to help students develop their skills in customer engagement. Where the students and partner organisation were closely engaged with each other, there was less of a need for a strong academic supervisory role. Real world problems arise with real world projects and, for example, one project in this initial run had a poorer outcome as the organisation didn't generate the materials needed until too late in the project timeline. However, these problems themselves are great learning opportunities as it mimics what they will see post-graduation in the real world.

Overall, using CERL within project modules was found to be successful and a good use of up-front investment in finding and developing projects with partners. Working in combination with other engaged academics and the Science Shop has helped to shape and spread this best practice. Personally, I gained a lot from the learning circle and built relationships and networks which continue to exist and support me beyond the specific activities.

Improving Student Engagement and Understanding through Real-world (CERL) Projects in the Centre for Dentistry at Queen's University

By Suzanne Russell, Centre for Dentistry, School of Medicine, Dentistry and Biomedical Sciences

In 2021, after completing the CIRCLET programme, the School was keen to engage with community outreach. It was decided to try the CERL approach to give dental students the opportunity to participate in research and learning projects based on community ideas and needs. We worked in collaboration with the module lead and Emma from Science Shop to identify a charitable partner who was interested in gaining more information for their users around the topic of dentistry and oral health.

Evidence Based Dentistry

The most appropriate module identified in which to place the project was Evidence Based Dentistry (DEN4010), which is delivered to students in their 4th year of study. The module is delivered through a series of lectures and 12 tutorials and is assessed by the submission of two papers – the first is worth 20% and the second 80%.

Learning outcomes included: Explain the term "Evidence-based dentistry", describe the main sources of evidence and their relevant merits, describe how and why research is carried out in dentistry and in other areas of healthcare, explain the advantages and disadvantages of applying EBD to clinical practice, and present examples of the use of EBD in contemporary clinical practice.

The topics covered in this module can be quite dry and difficult for the students to engage with. Through the addition of a real-world project, we hoped to increase student engagement, understanding and give an idea of how evidence-based dentistry could be used in future clinical practice. The module lead, Dr Ikhlas El Karim, was keen to see what a connection with community could produce in terms of engagement, and to develop a sense of professional responsibility beyond the surgery.

Working with the partner

Students were required to critically analyse a research paper (Primary quantitative studies such as Cohort studies, Randomised Control Trials, and Systematic Review Papers), the selection of which was based on a conversation with a community partner. The main points of interest for the charity were considered and a literature search carried out on these topics. All the students had to critically appraise a paper, with subgroups organising meetings, writing, doing the presentation and completing the write-up. The write-up would then be returned to the charity so was written in non-technical terms. A couple of groups also produced a leaflet.

The first year of the project (2020-21) we were partnered with the Springfield Charitable Trust. The Trust was keen to find out information on dental care for people with dementia or cognitive impairment who attend a day centre run by the charity.

In 2021-22, the charitable partner was the Children's Heartbeat Trust who support children and young people with heart disease in Northern Ireland. The Trust gave us a broad brief which included recommendations for how dentists safely treat children with heart defects. The wide literature search was helpful as there are limited research papers on children with heart defects and infective endocarditis.

This year the charitable partner is Cancer Focus Northern Ireland. The topic is oral health care and dental needs for patients undergoing cancer treatment. As a follow on to this project, a student is doing a summer project to take forward the work done by the 4th year group and produce some resources for the charity on oral health.

Student feedback

In the first year, the students were followed up in early May using a feedback form based on a template provided by another CIRCLET sub-group member. The timing of the feedback (during exam period) meant that there was only a 15% response rate, although all of these were positive. Students fed back that they learned how to take academic knowledge and present it to a lay audience; the fact that people needed the information they were producing gave it another dimension. The community project was not a compulsory element the first year it was offered. Soon afterwards, it was decided that the project was a helpful addition to the module so was made a compulsory element thereafter.

To assess this, on completion of the project, the students are asked to complete an MS form asking them to reflect on how they carried out the critical appraisal, their role in the team, and how this experience could be used in future clinical care. The form also asks for general feedback. The feedback this year showed that 98% of students found it a useful learning experience and 90% said they had a high level of ownership/buy-in and found it interesting.

2022

Dental Caries Prevalence in Children with Congenital Heart Disease – Systematic Review

Research Outcomes

Karikoski.E, Taisto Sarkola and My Blomqvist

Group A, B1, B2
QUB Dental Students

Main Outcomes

The latest updates from this paper

- **Indicated children with congenital heart disease (CHD) have a higher prevalence of caries** compared to healthy children
- **Maintaining good oral health in CHD** children is important
- No harmful/risks associated with the population or conduction of this study since it was based on observation alone

Background

Previous studies have suggested that poor oral health can be related to a buildup of bacteria in the blood stream that may lead to infection of the heart in children with CHD. Therefore, there is a need for more clinical research in this area to develop our understanding of the relationship between harmful microbes that exist in our mouth and their associated risk of infection with the heart in children with CHD.

Disease related to the oral cavity can increase the number and type of bacteria in the mouth such as gum disease and tooth decay. This paper only focuses tooth decay as the source of bacteria here and does not account for other oral diseases such as gum disease.

This emphasises the need for good practice among dental professionals to reinforce oral hygiene instruction to all patients who are at risk of caries. This paper alone is unlikely to change current clinical practice and modify practices for CHD children

CHILDREN'S HEARTBEAT TRUST
Northern Ireland's Children's Heart Charity
Charity no: NIC 102410

Strengths and Weaknesses of the study

Strengths

- Tries to summarise and link current knowledge of caries in children with CHD – who are at higher risk of infective endocarditis
- A systematic review is a type of study design that combines evidence and is usually good for influencing health decisions
- 2 independent researchers reviewed the 9 articles included in the paper
- Only included studies which used the method outlined by the World Health Organization to screen for tooth decay - a united nations agency who lead global efforts to expand healthcare

Weaknesses

- What is meant by the term 'healthy child' – this group was used as a comparison to our CHD group and isn't explained well
- Evidence collected for tooth decay differs among the studies – some base it off what the dentist sees and others from x-rays
- Different severities of CHD were included and some with other underlying syndromes therefore this was not kept consistent – caries might have been missed or less prevalent if children with milder forms of CHD
- Results vary in statistical significance and precision
- More sources could be used to screen for the chosen articles included in the study

Results 1	Results 2	Results 3
The latest updates	The latest updates	The latest updates
7 out of the 9 studies evaluated in total showed a higher rate of tooth decay in children with CHD than healthy children	**More research is needed before we can conclusively apply this study to our local population of children with different severities of CHD**	**The studies included in this paper showed a lot of variation –**

Page 1

Before taking part in the CIRCLET programme, this approach to learning had never been considered for this module in the dental curriculum at QUB. With the support and open-mindedness of senior colleagues within the School, the pilot and now compulsory projects have enhanced the students' learning in this area and exceeded our expectations. We are grateful to the charities who gave their time to make these projects happen.

Community Engaged Research and Learning (CERL): a transformative approach to education

By Linde Moriau, Department of Education and Student Policies, Vrije Universiteit Brussel, Belgium

In recent years, the concept of Community Engaged Research and Learning (CERL) has gained prominence as an innovative pedagogical approach (see for example Moriau et al., 2021). The concept of 'community' highlights the situated and contextualised nature of learning (Lave and Wenger, 1991). The 'engaged' dimension stresses its dialogical nature, requiring the involvement of multiple parties, expressing 'multitudes of multi-voiced meanings' (Bakhtin, 1986). Linking the term 'community' to 'engagement' serves to broaden the scope from traditional expert-driven and mono-disciplinary forms of research and education to more participatory and transdisciplinary modes of inquiry, seeking to create holistic perspectives and frames of reference allowing participants to observe, analyse, understand, and tackle complex issues.

At the heart of CERL is the belief in the transformative power of education. Building on the principles of critical learning theories, CERL seeks to challenge traditional power structures and promote social justice and equity. By immersing students in authentic experiences, CERL allows them to gain a deep understanding of societal issues and engage in critical analysis of existing systems and structures. CERL encourages students to question prevailing norms and assumptions, while actively seeking solutions to complex problems. Students become active participants in their own learning, taking ownership of their education and developing a sense of agency as they work towards positive social change (see for example Lubicz-Nawrocka 2018).

Rooted in the belief that learning is a social and active process, CERL emphasises the importance of authentic and cocreative educational approaches. Drawing from socio-constructivist theory, which posits that knowledge is constructed through social interactions, CERL provides a platform for students to actively co-shape their learning experience. Through targeted application of theoretical knowledge to practical contexts, students not only deepen their understanding of academic concepts but also develop important skills such as critical thinking, problem-solving, and effective communication (Cook-Sather, Bovill, and Felten 2014). For some students, these transformations go beyond university (Peseta et al., 2020).

Another key feature of CERL is its focus on reciprocal partnerships and relationships. Rather than viewing social partners as sources of data or beneficiaries of research, CERL emphasizes mutual learning (see for example Van Der Schueren, 2022). CERL practices recognise that extra-academic partners hold valuable knowledge and expertise that can enrich the learning process. By actively involving them in the design and implementation of research and learning activities, CERL promotes a more inclusive and democratic approach to education. This collaborative model fosters trust, respect, and shared responsibility and collective ownership towards addressing 'glocal' issues.

CERL also offers a unique opportunity for students to develop the skills and dispositions necessary for active citizenship and professional success in a complex and changing world. As students engage with diverse communities and navigate complex social issues, they learn to navigate ambiguity and embrace uncertainty, recognizing the inherent complexity of real-world problems. Furthermore, CERL fosters a sense of empathy and cultural competence, as students interact with individuals from diverse backgrounds and perspectives. This exposure to different worldviews and experiences cultivates a broader understanding of social issues and promotes a more inclusive approach to problem-solving. By working collaboratively with their peers, lecturers and extra-academic partners, students learn to value diverse perspectives, challenge their own biases, and develop a deeper appreciation for the complexities of the human experience.

In conclusion, Community Engaged Research and Learning (CERL) offers a transformative approach to education that aligns with socio-constructivist and critical learning theories. By actively engaging with local stakeholders and addressing real-world challenges, CERL promotes active learning, critical thinking, and the development of important skills necessary for students to thrive in a complex and changing world. Through partnerships and reciprocal relationships, CERL fosters collaborative learning environments that empower students and community members alike. By preparing students to be engaged citizens and professionals, CERL holds the potential to create positive social change and contribute to a more equitable and just society.

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Reflections on Developing an Online Continuing Professional Development Module to Support Staff to Build Community Engaged Research and Learning (CERL) into their Teaching.

Dr Caroline McGowan, Dr Catherine Bates, Dr Sinead McCann. Technological University Dublin

Dr Caroline McGowan

Dr Catherine Bates

Dr Sinead McCann

Introduction

As previously mentioned in this edition, CERL involves students working with community partners on collaboratively-designed, real-life projects, supervised by lecturers within the curriculum, for mutual benefit. As part of Technological University Dublin's involvement in the CIRCLET Erasmus+ Strategic Partnership Project, led by our colleagues in QUB's Science Shop, we took on the challenge of developing and implementing a new online Continuing Professional Development (CPD) module for academic staff in the 5 partner universities.

To frame this reflection, we use the 'Task, Process, Relationships' model developed by Partners Training for Transformation, one of our community partners (Sheehy, 2001). This model shows how any collaboration involves those 3 key dimensions, which are fundamentally dependent on each other. We used the model in the CPD module as a helpful framework for the participants to consider when planning their CERL projects with community partners, so it feels particularly appropriate to use it here.

Task

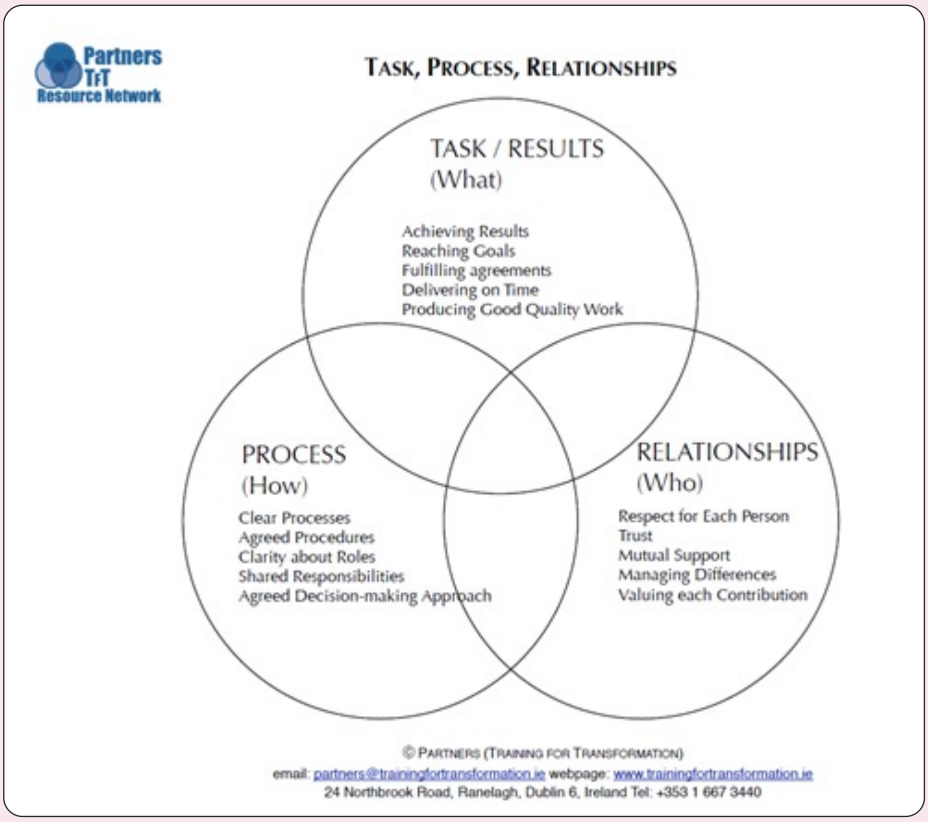
We developed this module because we knew lecturers wanted to develop their understanding and skills in relation to CERL. We felt that some lecturers would prefer the structure of an accredited programme as a way to engage with relevant literature and case studies on CERL, and work through assignments to help them start, or develop, their CERL practice. (For those who might prefer a more informal learning environment, our colleagues on the CIRCLET project were working on designing a learning circle, as discussed elsewhere in this volume.) The module was designed to develop participants' capacity to rethink their modules, so they could provide students with authentic, real-life learning and experience through CERL, including supporting participants to acquire relevant knowledge, skills, attitudes and values.

Process

We took a constructivist, emancipatory approach to the module (Tassone and Eppink (2016, p.19)), so that we could build on the extensive knowledge, skills and experience of the lecturers participating in it. We developed, in collaboration with the CIRCLET project team and our advisory board (more later about how these groups supported us), 8 themes which we felt the module needed to address. We then developed a range of resources and short formative assignments to support the participants' learning on each theme, as well as designing a webinar to explore each one. We took a flipped learning approach, to enable participants to learn asynchronously in their own time. We asked them to engage with the material and mini-assignments on each topic before each weekly webinar. This enabled us to make the most of the hour we spent together online, so that it could be a really interactive experience. We combined group and individual assignments, and underpinned the whole module with regular reflection tasks and assignments, as well as supporting peer learning.

The final assignment was in 2 parts. The first required participants to design a CERL project, in collaboration with a community partner, and for both partners to complete and sign a detailed 'timeline agreement form' for their CERL project, which they committed to run within a year. The second part of the assignment was a summative reflection on their learning from the module.

We supported 9 participants to successfully complete the first run of the module, and a tenth who made a decision not to pursue the module credits, but to focus on their CERL work instead. Almost all participants ran CERL modules with their students following the module, in collaboration with community partners. We regularly sought feedback from participants, which was mostly positive but highlighted some challenges, with the workload in particular. After the first run of the module, we reviewed the module as a facilitation team, and with our CIRCLET project team partners and our advisory board, edited and improved the resources lists, assignments and webinar plans, with a focus on responding to the feedback from participants. The second run of the module finished in January 2022, and again the evaluations were largely very positive. A few participants even described some of their learning as transformative.



Relationships

This module was collaboratively developed, implemented, evaluated and improved by the authors, with input from a range of international colleagues and local and national stakeholders. Reflecting on the development of the module, we were struck by how we depended on relationships as key enablers at every stage of the process. The rich, supportive, trusting relationships between the module facilitators, and between them and the international CIRCLET project team members, and the members of the TU Dublin CIRCLET advisory board (community partners, lecturers, educational developer colleagues, etc) were vital in creating a supportive and constructively critical learning environment, informing the design of the module to be as diverse and inclusive as possible.

We also got some wonderful materials from the CIRCLET project team – for example, videos of community partners describing their experiences and challenges - which we were able to use in the sessions very effectively. We benefitted from having guest inputs from the project team, and from people they had relationships with, such as a QUB graduate who spoke to our participants about her experiences of doing CERL as a student. Co-designing the session on the theme of reflection with a colleague from Corvinus University of Budapest was a very rich and inspiring collaborative process.

The relationships which we as facilitators built with the participants, and those between the participants themselves, were also central. We created lots of opportunities for the participants to learn with and from their peers – asking them to meet in breakout rooms during the module webinars and also to complete group work on the formative assignments. While participants might complain about the challenges of coordinating group work, peer learning is a very effective way to support their development. A report on studies on CPD for educators and for managers, based on international evidence found that CPD approaches which demonstrated the characteristics linked to effectiveness all focused on relationships. The 4 key approaches cited were: collaborative enquiry; coaching and mentoring (co-coaching by peers in particular empowered practitioners; networks; and structured dialogue and group work (Cordingley and Bell, et al, 2012).

Within the webinars, our community partners, academic colleagues, learning and teaching colleagues and students, as guest speakers or webinar co-facilitators, provided us with really helpful insights, and made CERL feel more real to the participants – the community partner perspective was particularly important here. Participants learned with and from community partners, lecturers and students. Building relationships is a fundamental skill required by all participants in CERL. We aimed to build a supportive learning network for participants, to sustain them after the module had finished (as per Haythornthwaite, 2006).

Transformation of teaching and learning: a return to authenticity

The CPD module was informed by CERL developments within each university involved in the CIRCLET project. Having worked with TU Dublin lecturers, students and community partners for over 15 years in Students Learning With Communities, and the international CIRCLET team, we could see the value and impact of curriculum-based Community Engaged Research and Learning.

Participants in the online module session just before Christmas 2020

Within the CPD module we were supporting the lecturers to develop their own skills, knowledge and confidence to co-create CERL projects with community partners. Module activities such as meeting community partners and listening to their experiences, working 1-2-1 with the course facilitators, reflecting on their experiences and co-creating resources with peers, all of these activities are similar to those completed by students working on a CERL project. They involve key skills such as listening, interpersonal skills and team work, to name a few. Community engaged research and learning is rewarding and challenging at the same time. The practicalities can be challenging (for example in terms of co-creation where there are new relationships and groups to navigate, including differing contexts, ideals and perspectives) yet the underlying epistemology of students integrating classroom knowledge into real life contexts, closing the gap between theory and practice, can be highly rewarding.

With advances in ChatGPT and other generative AI tools we now face significant challenges in relation to teaching and learning and assessment in Higher Education, so the value of this constructivist, authentic, real-life teaching and learning method can become apparent.

As life becomes more artificial, authenticity, real experiences and real relationships will become more valued. CERL is about meaningful collaboration on tasks, creating authentic human connections, relationships, processes and experiences. It provides all stakeholders with the opportunity to build relational skills and to develop meaningful relationships. Within the CPD module the collaborative sessions involved listening, sharing experiences, being raw, open and honest and having discussions which sometimes were uncomfortable, however, this helped to build empathy and enabled the participants and facilitators to see the world through someone else's eyes. It became clear that shared values, ethics, and attitudes can reinforce a sense of belonging and it is that which can make a difference on a societal level - as was the purpose of the CIRCLET project.

If you want more detail on our module, our **Guide for Facilitators** is available on the CIRCLET website.

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Reflections on Learning Circles of Lecturers for Community Engaged Research and Learning

Dr Réka Matolay, Márta Frigyik, Dr Andrea Toarniczky, Dr Judit Gáspár, Corvinus Science Shop at Corvinus University of Budapest.

Márta Frigyik, Judit Gáspár, Réka Matolay and Andrea Toarniczky

Reflection on teaching and learning practices for community engagement was at the core of our Learning Circles for lecturers in the CIRCLET project. Every partner organisation ran their own Learning Circles in their own university, where academic staff received peer and Science Shop support to reflect on and reimagine their modules to embed collaboration with community partners. Reflection took place on various levels and in multiple ways, therefore we also covered it in a chapter in our Guide for Facilitators of Learning Circles for CERL.

The overall goal of our Learning Circles (LCs) in CIRCLET was to equip academic staff for Community Engaged Research and Learning (CERL) practices. The LCs were small gatherings of lecturers who met to study their shared interest: how to incorporate CERL in their modules and teaching. The LCs provided facilitated peer-learning, building on the interest, needs and experiences of participants in a safe learning environment. In our LC design, each year, during the fall semester, the participants of the LCs started their experiential learning journey of reimagining their modules for CERL in longer, half-day LC sessions as workshops and shorter, 1-hour small group discussions, both promoting reflection by lecturers in various ways. One layer of reflections targeted the lecturers' pedagogical approaches, practices, values and beliefs, etc. The other layer focused on the importance of student reflection in the CERL project and how to embed the promotion of student reflection into the teaching and learning process. In the following spring semester, the lecturers delivered their adapted module with a community project. Peer and Science Shop support were provided in both semesters in various forms and using various formats for communication (online or in person workshops and drop-in sessions, phone calls, email etc.).

How we designed our Learning Circles

The CIRCLET methodology relies on experiential learning approaches (Kolb, 1984; Morris, 2019), which are also essential in CERL projects. These emphasize the importance of blending experience, reflection and theory, while at the same time offering clarity on their sequence and possible interconnections. The experiential learning model (Morris, 2019) was used to design each Learning Circle session; integrating brief theoretical introductions with exercises designed to explore their practical application, followed by reflection and further experimentation. Participants were invited to uncover their own learning style, which influences their approach to the experiential learning cycle. Individuals with different learning styles may prefer to complete the experiential learning cycle, for example, in a different sequence. In line with this, the Learning Circle design offered them the possibility of experimenting with new ways of learning. Participants could learn to recognise and value each others' strengths, while being supportive of each other in relation to those areas which they needed to develop further, through understanding different learning styles. T his increased openness and inclusion in the circle, which helps to build trust among participants and facilitators. Appreciating the different learning styles was particularly important when collaborating with community partners on CERL projects.

Diversity and variations in our Learning Circles

To maximise learning we aimed for diversity of lecturers in many senses, including their level of experience with teaching and CERL. This was a key element for encouraging peer discussions and learning on CERL approaches which inherently build on diverse voices. Key LC elements included implementing experiential learning cycles, identifying learning styles and using reflection tools supporting reflection by lecturers, as well as learning about reflection in a way to support student reflection in CERL projects.

The diverse local contexts and needs across CIRCLET universities were valued and respected, thus our LC design allowed for local variations. By being participant-driven, LCs ensure that the content covered is relevant and responsive to the needs of academic staff, resulting in a more personalised and effective learning experience. Several characteristics of our LCs were shared (i.e. Science Shop and/or educational staff provided facilitation as CERL experts), and others varied across the local LCs. The inclusion of community partners, again, was a common feature. However, the stakeholders varied: students participating in CERL projects were involved in certain local LCs for one or more LC sessions, and members of the university management in other local LCs to set the local context for community engagement in higher education. One of our key reflections in CIRCLET about designing and running LCs for CERL is very encouraging learning: although LCs require a careful design for trust, learning and reflection, it allows for various and multiple approaches and formats. LCs also require commitment and support to maintain, but these are easy to launch in various contexts.

Reflection in Learning Circles for CERL

Reflection was at the heart of the reimagination of modules in LCs, thus we experimented with reflection on various levels in CIRCLET. Since our process was rooted in experiential learning a reflective element was embedded along the way, and reinforced by structures of the LC process, such as the small group – triad, quad – meetings of lecturers to progress reflection, space provided for lecturers to showcase their competences at facilitating reflection, and tools and instruments applied for self- and student reflection. We aimed to explore reflection as a process that works through multiple ways of knowing, and develops in company, while being sensitive to context and timing. We were inspired by several sources (see e.g., Concetta et al, 2016, Cunliffe, 2009; Marshall, 2019), and also offered an international half-day online workshop in collaboration with a community partner on facilitating student reflection.

Reflection in LCs was exercised in multiple ways, both individually and via peer support (small and full group reflections). There were free flowing as well as structured reflection elements, brief and lengthy reflection occasions. Reflection covered various domains: self-reflection and reflection on others, contexts etc. and the interrelations of these. Reflection involved various ways: oral, written and other formats. One example of brief, individual, written reflections is the Reflective Prompts, which is a 15-minute individual reflection embedded into the relevant part of the LC session. These usually include three questions or statements each consisting of a scale for quick self-reflection, and a place for lecturers to capture the thoughts that led them to choose that number on the scale. The prompts are used to establish connections between the concepts and considerations for CERL explored in the LC and the lecturers' own teaching and learning practices.

If you want to know more about our LCs including practical guidance for local and international LC sessions as well as details to reflection oriented tools, our Guide for Facilitators: **Learning Circles for Community Engaged Research and Learning** is available from the CIRCLET website. In this guide we share our approach to designing the sessions and how we ran them, and our reflections regarding risks and feasibility, providing detailed workshop plans, featured exercises and activities, reading lists and other resources, as well as information and reflection prompts to send to participants. We think of this guide as a kind of cookbook. When designing your own Learning Circle, you can use it to select the ingredients that appeal to you, to create your own menu, according to your own taste and local cuisine, and that of your participants.

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Further Resources: Project Reports and Case Studies

The CIRCLET project yielded five written reports and a wide range of case studies.

CIRCLET Consortium members at Living Knowledge Conference at Groningen, July 2022

CIRCLET project outputs

Project outputs are available on the **CIRCLET website**.
These include:

- CIRCLET Guide for Lecturers: Resources to Implement Community Engaged Research and Learning in University Teaching and Pedagogy
- Learning Circles for Community Engaged Research and Learning: Guide for Facilitators
- Online Continuing Professional Development Module Guide for Facilitators

There is also a wide range of case studies where you can draw inspiration from CERL teaching practices across many different disciplines and five partner countries.

CIRCLET project case studies

Here are some inspirational examples to explore, with weblinks to either written or video resources.

Architecture and Planning

Architecture students re-designing/re-purposing a former factory, based on interviews with ex-employees

Emma Geoghegan, TU Dublin
BArch Architecture
Link: **https://circlet.eu/tud-case-2/**

Open Botanic, developing a cycling strategy for Botanic Avenue

Laura Michael, Queen's University Belfast
Link: **https://circlet.eu/qub-case-4/**

Communication and Marketing

Tourism students developed Dublin heritage trails across 3 modules

Catherine Gorman, TU Dublin
BA Tourism Management
Link: **https://circlet.eu/tud-case-1/**

Enhancing visibility of a non-profit casting agency

Attila Simay, Corvinus University of Budapest
MA in Marketing
Link: **https://circlet.eu/cub-case-4/**

International marketing plan for social enterprises

Anna Török, Corvinus University of Budapest
BA in Commerce and Marketing
Link: **https://circlet.eu/cub-case-3/**

Students work in communication services for non-profit organisations

Amalia Creus, Universitat Oberta de Catalunya
BSc Communication
Link: **https://circlet.eu/uoc-case-2/**

Creative digital media students developed website designs for a community partner

Helen Williams, TU Dublin
BA Creative Digital Media
Link: **https://circlet.eu/tud-case-6/**

Computer Science and Mathematics

Machine learning to analyse statistics on cultural audience engagement during COVID-19

Gareth Tribello, Queen's University Belfast
BSc Maths
Link: **https://circlet.eu/qub-case-3/**

Embedding public transport simulation for community in an undergraduate mathematics module

Gareth Tribello, Queen's University Belfast
BSc Maths
Link: **https://circlet.eu/qub-case-6/**

Systems administration and support

Olga Pischukhina, Queen's University Belfast
BSc Computer Science
Link: **https://circlet.eu/qub-case-9/**

Computer Science students developed culturally-specific website templates to attract international tourists

Deirdre Lawless, TU Dublin
BSc Computer Science
Link: **https://circlet.eu/tud-case-4/**

Designing Apps for community organisations

David Cutting, Queen's University Belfast
BSc Software Design
Link: **https://circlet.eu/qub-case-1/**

Education

The fitness of and purpose of the SDGs

Dina Belluigi, Queen's University Belfast
MSc Educational Studies
Link: **https://circlet.eu/qub-case-7/**

Applying the potential of ICT as a means for social action and community development

Gemma Abellán Fabrés, Universitat Oberta de Catalunya
Social Education
Link: **https://circlet.eu/uoc-case-3/**

Drama students developed and piloted lesson plans for primary school drama workshops

Sarah Fitzgibbon, TU Dublin
BA (Hons) Drama Performance
Link: **https://circlet.eu/tud-case-7/**

Education x inequalities: Film series "Karmas – Everyday Heroes"

Ágnes Horváth, Corvinus University of Budapest
BA International Studies
Link: **https://circlet.eu/cub-case-1/**

Interdisciplinary

Students make an interdisciplinary analysis of a complex practical problem provided by a local organisation and design solutions

Gustavo Garcia Botero, Vrije Universiteit Brussel
MSc Educational Sciences
Link: **https://circlet.eu/vub-case-2/**

Cross-disciplinary in practice: Critical reflections on humanity and society

Karl Verstrynghe, Vrije Universiteit Brussel
Link: **https://circlet.eu/vub-case-1/**

Business Sustainability and Entrepreneurship
Developing a transdisciplinary module 'Hack 4 Sustainability' where students work collaboratively with community partners on sustainability issues

Lucia Walsh, TU Dublin
Link: **https://circlet.eu/tud-case-12/**

Management

Corporate Social Responsibility and Social Entrepreneurship

Nikolay Dentchev, Vrije Universiteit Brussel
MSc Corporate Social Responsibility / BSc Social Entrepreneurship
Link: **https://circlet.eu/vub-case-4/**

Potential CSR cooperations for a non-profit casting agency

Katalin Ásványi, Corvinus University of Budapest
BA Commerce and Marketing
Link: **https://circlet.eu/cub-case-8/**

Integrating social enterprise into a non-profit

Éva Révész, Corvinus University of Budapest
MA in Management and Organisation
Link: **https://circlet.eu/cub-case-5/**

Sustainability problem solving with Greenpeace and Fridays for Future

Gabriella Kiss, Corvinus University of Budapest
BA International Business
Link: **https://circlet.eu/cub-case-6/**

HR postgrad students evaluate HR-oriented communication of an autism association

Andrea J. Klér, Corvinus University of Budapest
PhD Human Resources Management
Link: **https://circlet.eu/cub-case-2/**

Economic students developed for new opportunities for Gaelic athletic clubs to generate revenue post COVID

Catarina Marvão, TU Dublin
BSc (Hons) Economics and Finance
Link: **https://circlet.eu/tud-case-9/**

Ideation on regenerative value creation with non-profits

József Veress, Corvinus University of Budapest
BA Business Informatics
Link: **https://circlet.eu/cub-case-7/**

Postgraduate Finance students developed research for their community partner to use in a funding application

Lucía Morales, TU Dublin
MSc Finance
Link: **https://circlet.eu/tud-case-10/**

Awareness raising for service dogs by Marketing students

Zita Komar, Corvinus University of Budapest
MSc Marketing
Link: **https://circlet.eu/cub-case-14/**

How othering, taboo topics and aggression are connected in our everyday lives

Veronika Lajos, Corvinus University of Budapest
BA Human Resources
Link: **https://circlet.eu/cub-case-10/**

Students working with mentoring social enterprise on reducing school dropout

Máté Farkas-Kis, Corvinus University of Budapest
BA Human Resources
Link: **https://circlet.eu/cub-case-9/**

Medicine, Dentistry and health

Biomedical design students developed 3-D printed designs to support individuals and communities

Robbie O'Connor, TU Dublin
BEng Biomedical Design
Link: **https://circlet.eu/tud-case-5/**

Pharmacy technician students co-designed fundraising events with community partners

Kathy Young, TU Dublin
Higher Certificate in Pharmacy Technician Studies
Link: **https://circlet.eu/tud-case-3/**

Summarise a systematic review of dental issues in patients with dementia

Suzanne Russell, Queen's University Belfast
BDS Dentistry
Link: **https://circlet.eu/qub-case-5/**

Skin cancer and sunbed use in Northern Ireland

Maelíosa Mc Crudden, Queen's University Belfast
BSc Biomedical Sciences
Link: **https://circlet.eu/qub-case-2/**

Weaving scientific outreach and CERL into biomedical sciences and human biology currciula

Maelíosa Mc Crudden, Queen's University Belfast
BSc Biomedical Sciences
Link: **https://circlet.eu/qub-case-8/**

Music -based intervention in patients with Alzheimer's disease

Marco Calabria, Universitat Oberta de Catalunya
MSc Neuropsychology
Link: **https://circlet.eu/uoc-case-1/**

Bridging the gap between two knowledge worlds: The science and the practice of martial arts

Hebe Schaillée, Vrije Universiteit Brussel
Movement and Sports Sciences
Link: **https://circlet.eu/vub-case-3/**

Sociology and Social Care

Social Care students worked with a variety of not-for-profit organisations in the areas of management and leadership

Margaret Fingleton, TU Dublin
MA Social Care Leadership and Management
Link: **https://circlet.eu/tud-case-13/**

Research on housing with disabilities by Sociology students

Ákos Bocskor, Corvinus University of Budapest
BA Sociology
Link: **https://circlet.eu/cub-case-13/**

Other Sciences

Horticultural students developed resources to support allotment owners production and preservation methods to minimise food waste

Ana Cañizares, TU Dublin
Higher Certificate in Science in Food Science & Management
Link: **https://circlet.eu/tud-case-8/**

Bioscience students developed a 'switch in stem' event which consisted of biology workshops for local primary school pupils

Leanne Harris and Dr Marcus Maher
BSc (Ord) Biosciences
Link: **https://circlet.eu/tud-case-11/**