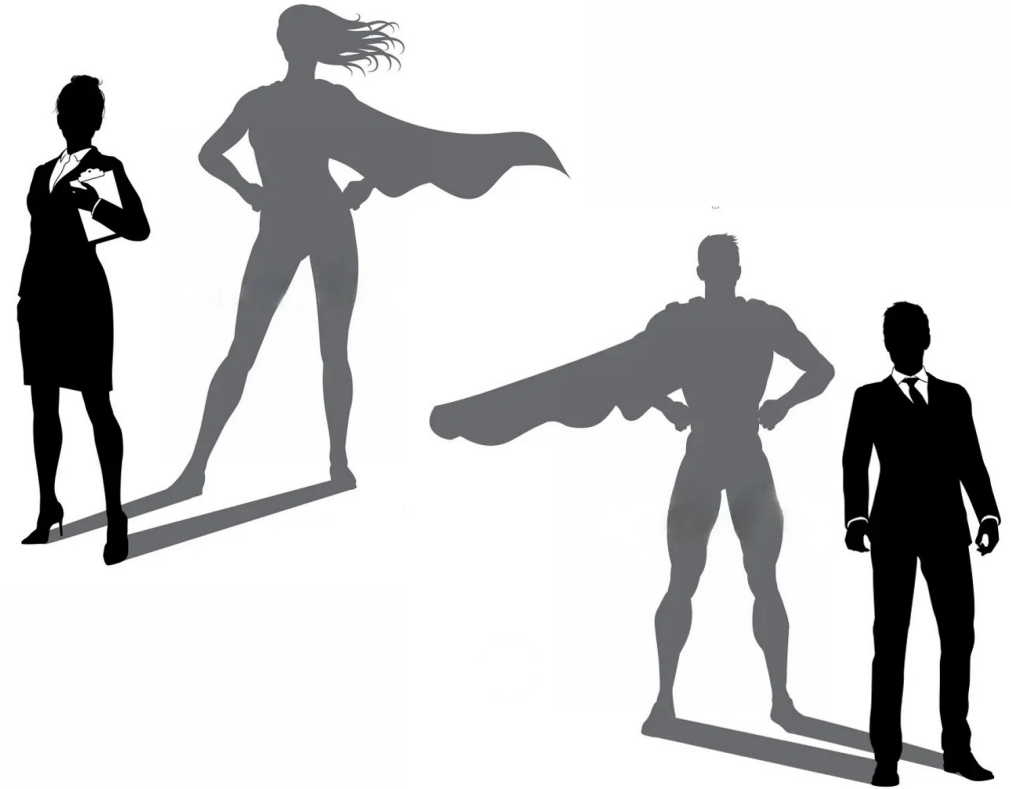




OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

The Power of Science Outreach-Conscious Teachers



Dr. Veronica McCauley & Dr. Kevin Davison

Associate Professor of Science Education
School of Education, University of Galway, Ireland

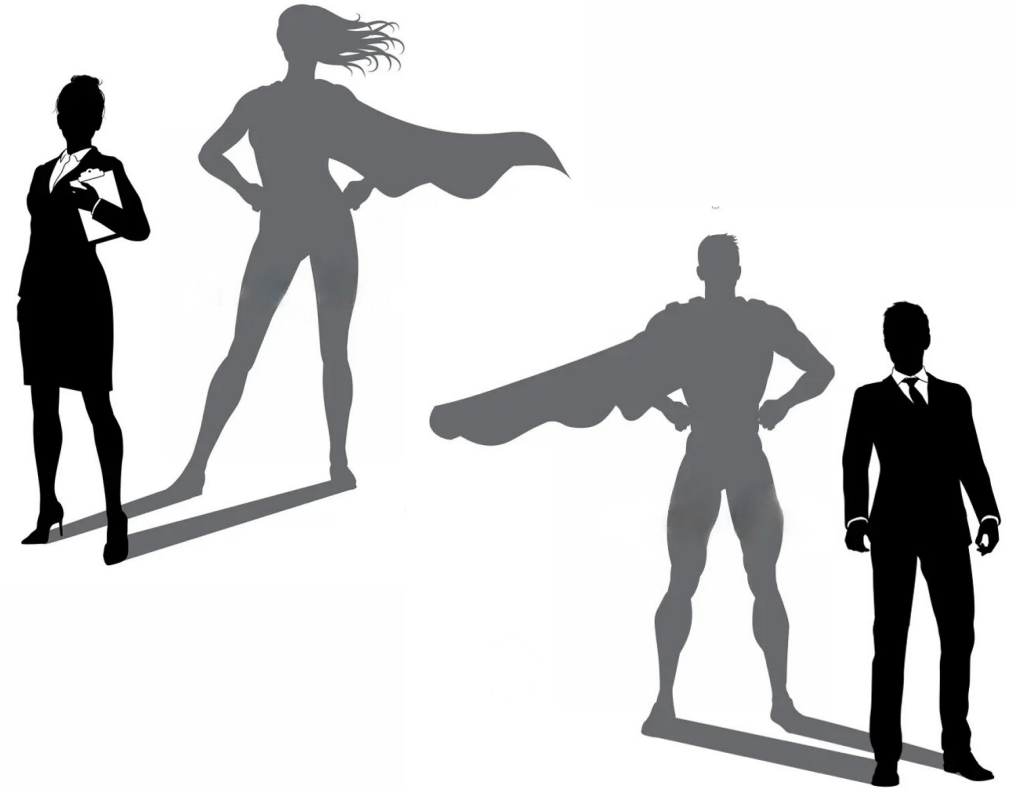
New Perspectives in Science Education Conference, 2024



We want you to **think about** the **Power** of **'Outreach-Conscious' Science Teachers**.

We're not saying that teachers are like science outreach superheroes.

Or maybe we are?



Teachers have **significant power in the classroom**.

They have the **power to convince students** that:

- *science is important in **their** daily lives*, and
- that ***their** students' voices are important to science*.

Pathways to Higher Education



Science outreach programs at universities commit to *increasing student participation*, *addressing workforce shortages*, and *broadening representation in science*.

Science Departments in Higher Ed negotiate access to parachute science into the classroom, but in doing so, they overlook the biggest influencer of all!

...The Teacher



Pathways to Higher Education



Teachers are one of the lead
influencers of student
behaviour

(Inda-Caro et al., 2019; Smith and Twaddle, 2023)

*... and yet how often are teachers asked to
take a lead role in outreach work?*

As Teacher Educators...do we train our teachers to also be

Outreach-Conscious Teachers?



Marketing Science



When influencing behaviour, **Social Marketing's Client Principle** states that the first step is to gain a deep understanding of the target audience.

(Domegan et al., 2015)

... and who is best placed for this in our classrooms?

If we consider a science disengaged student, who due to cultural/societal influences perceives **science as unrelated to their lives**, teachers can play a **pivotal role in situating science** within that student's context.



The Power of Science Outreach-Conscious Teachers

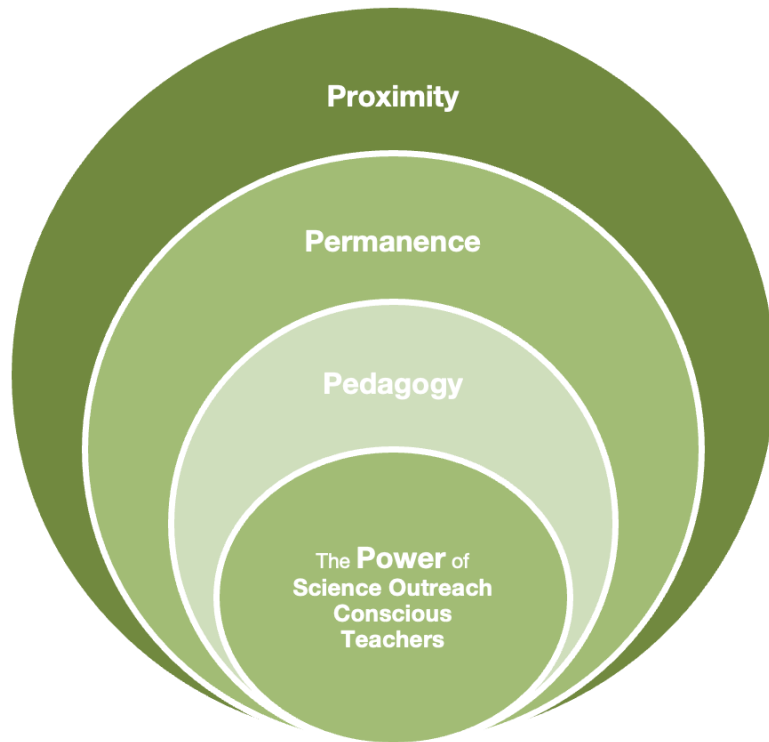


Figure 1. The Power of Science Outreach-Conscious Teachers
(Proximity, Permanence and Pedagogy)
(McCauley et al., 2024)

We ask outreach leads/teacher educators:

Consider, collaborating with and **empowering teacher stakeholders** who are already in a strong position to **promote positive change in science.**

Teachers possess proximity, permanence, and pedagogical theory (pedagogies that value students voices and help them feel they belong in science), and can be a power presence to influence positive change.



Science Outreach-Conscious Teachers

Quote from PhD Research, **interview data** collected from **primary school teachers** and from **science outreach practitioners** who visit classrooms, to get a better sense of the teacher's role in science and an outreach person's role in the science classroom.

“...**both** teachers and outreach practitioners see the **value of a balance** between establishing **creative and guided environments** depending on the context, ...in practice although both groups have a preference towards facilitating creative environments... [*however teachers have a*] **heightened awareness of classroom/curricular constraints**”

(Martins Gomes & McCauley, 2021 p 515)

Recommendation: strengthen **School-University Partnerships**

(Stockmayer et al. 2010: The Third Space, between Formal and Informal Science Education)



Science Outreach-Conscious Teachers

Recommendation: strengthen **School-University Partnerships**

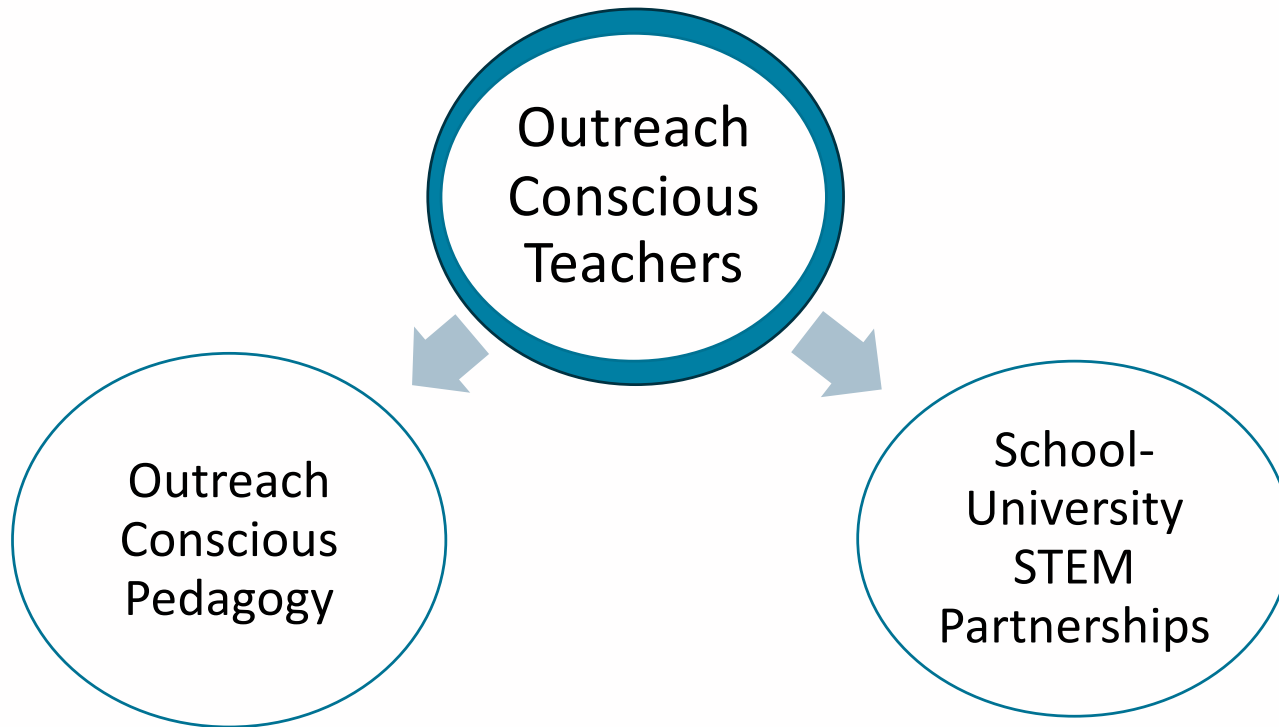


Suggestion: **empower teachers with outreach-conscious pedagogies**

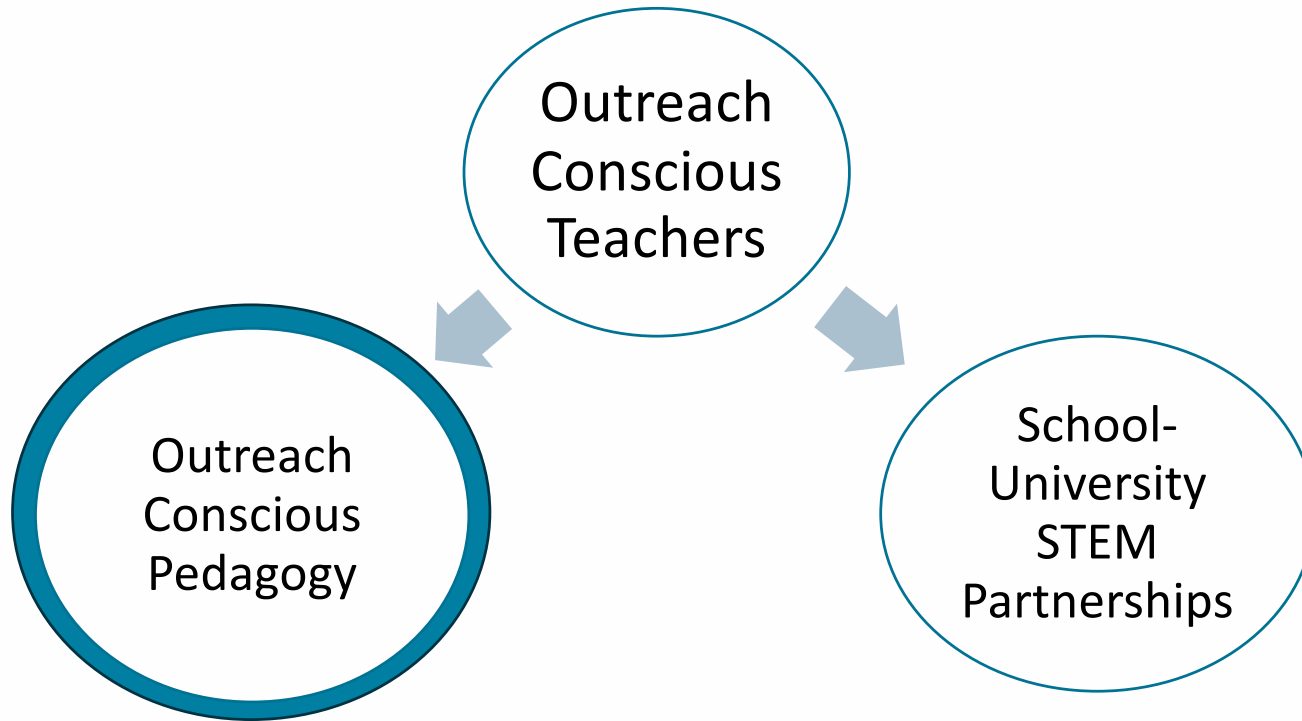
To support a **science education that values all students' participation** in science
...whether it's girls in physics, boys in biology, equity of access



Science Outreach-Conscious Teachers



Science Outreach-Conscious Teachers



Science Outreach-Conscious Pedagogies

“The teacher-student relationship is one of the most important forms of social capital [Bourdieu’s theories on social stratification], where a teacher’s power for change cannot be undervalued. If we consider that the science capital of a student is a function of the quality of the relationship with their teacher; **then** the attitude and behaviour of a teacher can significantly impact:

- content knowledge transfer to the student,
- a student’s interest in science,
- their aspiration to study science, and
- whether or not they feel they belong in science.

As such, the Science Capital Teaching Approach is certainly an approach that Outreach-Conscious Teachers should engage with.”

(McCauley et al.,2023, p.2)



Science Outreach-Conscious Pedagogies

The SCTA pedagogy is evidence-based, devised by UCL and aims to broaden the reach of science.

<https://www.youtube.com/watch?v=hWWPUK3xZ0>

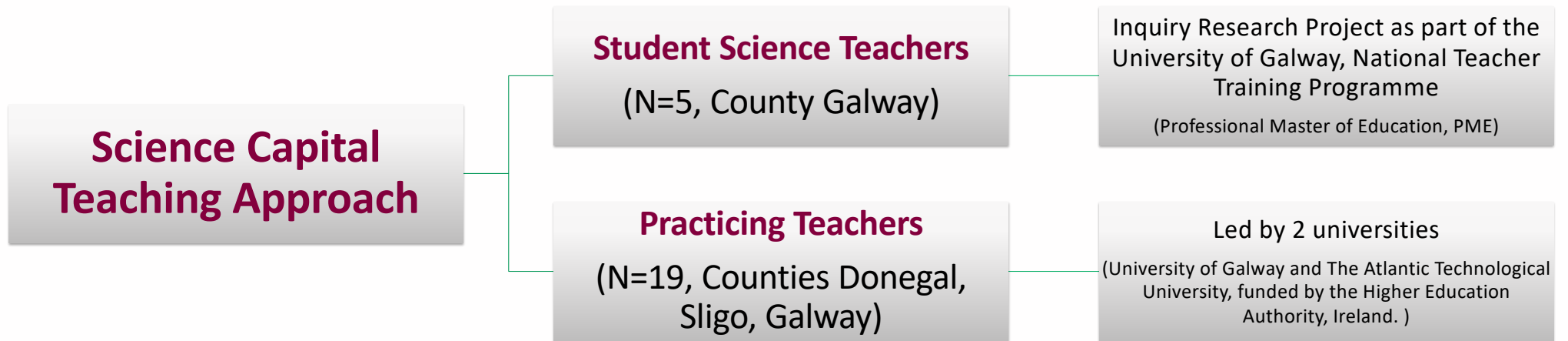


We are at the initial stages of trying it out in Irish Schools across the West of Ireland.



OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

2 Projects Ongoing, outputs due late 2024



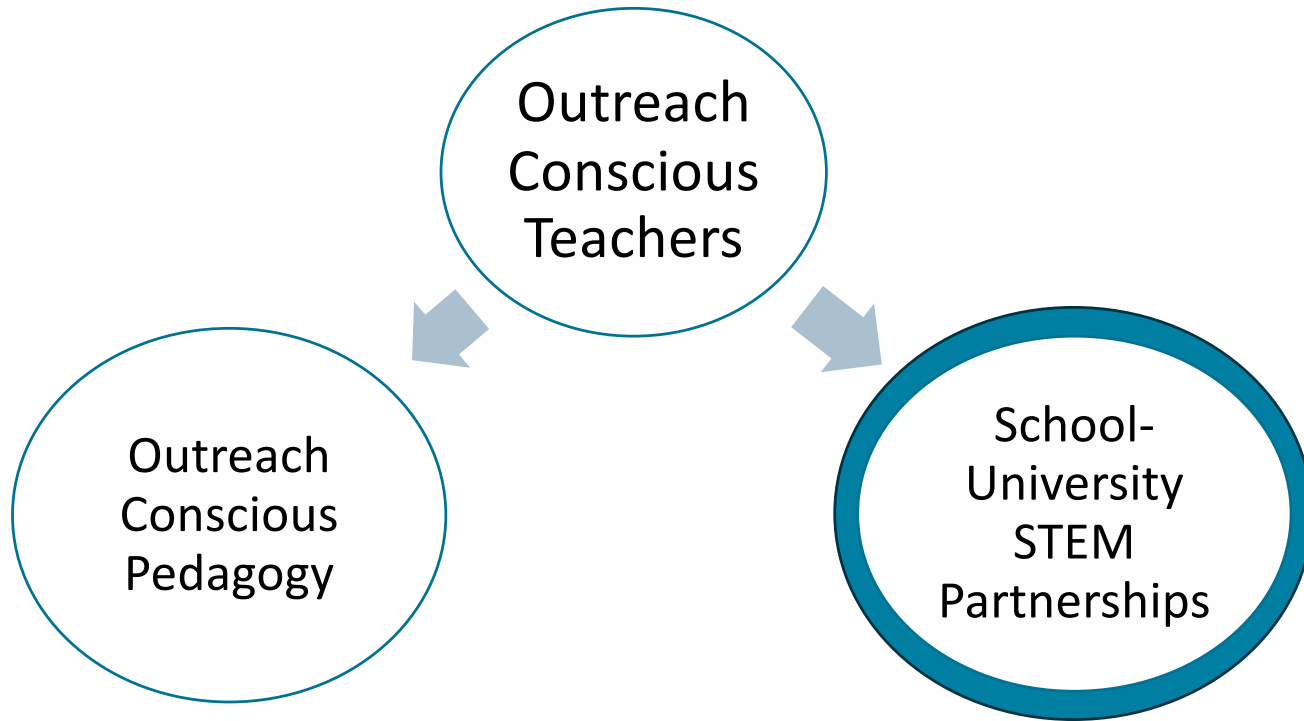
OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY



CREATING
PATHWAYS
TO HIGHER
EDUCATION



Science Outreach-Conscious Teachers



Teacher-University STEM partnerships

*To support teachers in **designing authentic learning experiences and integrating science experiences within real-world contexts**, first hand experiences are essential*
(Hurley et. al., 2021)

The University of Galway offers teachers 2 'first hand experiences' in science careers:

- **Teacher Internships in STEM Industry** [pre-service teachers]
- **Teachers' Residence in Science at University** [in-service teachers]



Creating Outreach-Conscious Science Teachers

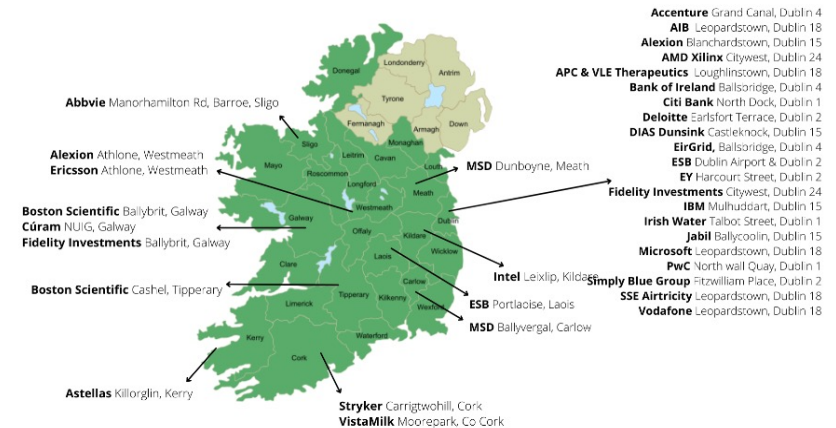
Opportunities for teachers to engage in industry and university careers

Joined a partnership with the 7 universities in Ireland to offer a **STEM Teacher Internship Programme**.
Student Teachers can apply for paid industry placement during the Summers of their teacher education programme.

Benefit for teachers – for example, insight into industry that they can draw on in their teaching

Benefit to industry – for example, direct pathway into education and future pipeline

STInt HOST LOCATIONS



STEM Teacher Internship Programme

A DUBLIN CITY UNIVERSITY INITIATIVE TO INSPIRE INNOVATIVE LEARNING



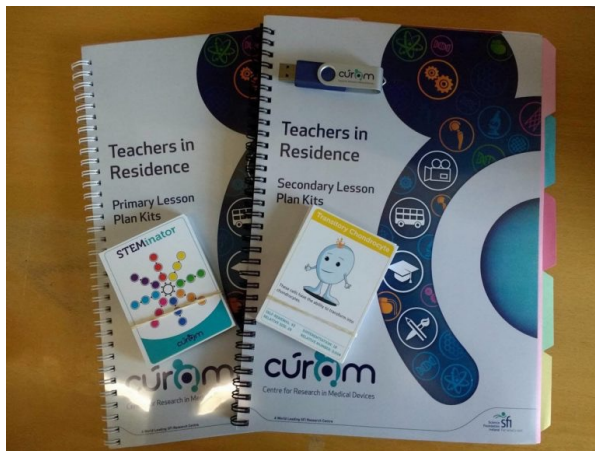
OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY



Creating Outreach-Conscious Science Teachers

Opportunities for teachers to engage in industry and university careers

Newly qualified teachers can apply for a 'Teacher in Residence' programme with CÚRAM (*medical devices institute, Uni of Galway*), where they learn about the science, inquiry & engagement activities and create lesson plans with scientists and upskill in the work of scientists in Universities.



Our research programme, driven by specialist researchers, industry partnerships and clinicians, is developing solutions for global health challenges:

- Chronic and acute respiratory diseases
- Cardiovascular Disease (CVD)
- Diabetes
- Neurological Disorders
- Musculoskeletal conditions

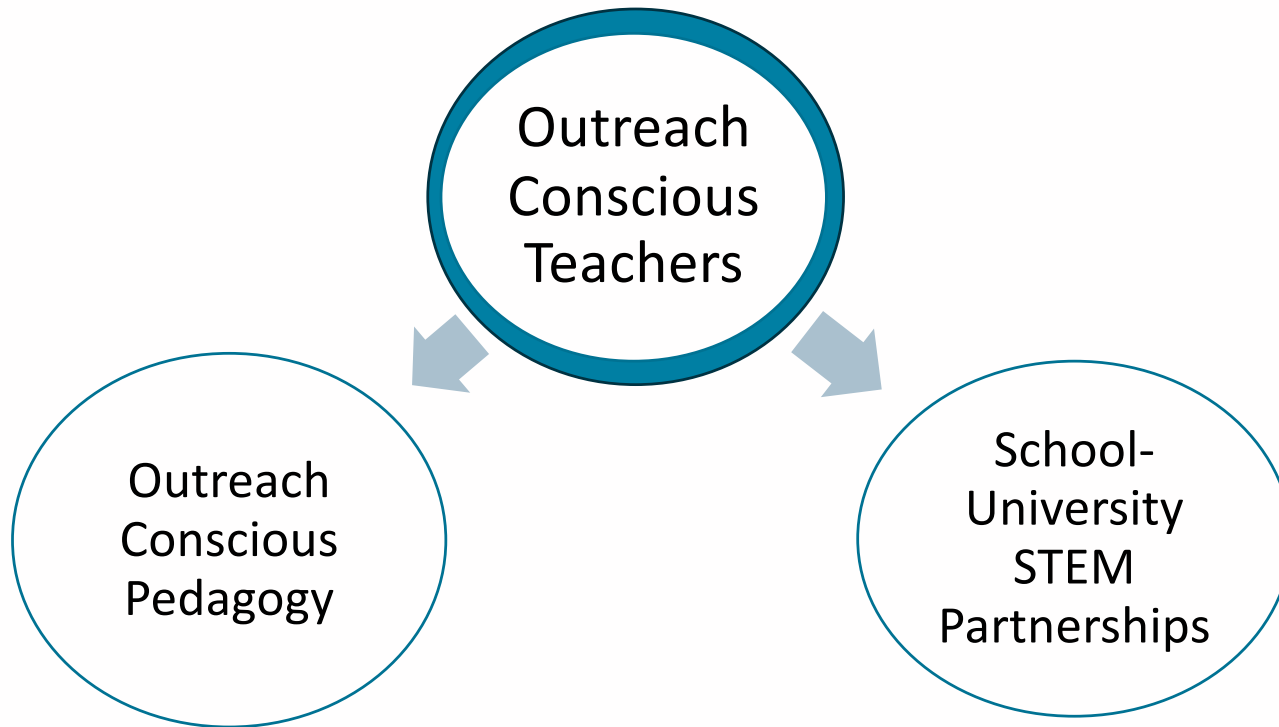
Benefit for teachers – for example, insight into science research at university that they can draw on in their teaching

Benefit to university – for example, direct pathway into education and future pipeline



OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

Science Outreach-Conscious Teachers



The Power of Science Outreach-Conscious Teachers

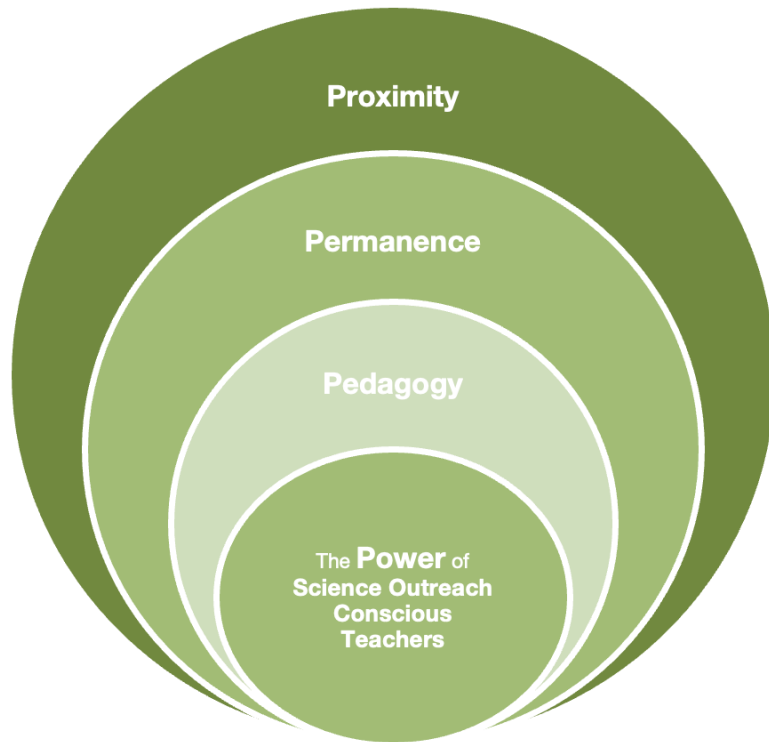


Figure 1. The Power of Science Outreach-Conscious Teachers
(Proximity, Permanence and Pedagogy)

(McCauley et al., 2024)

In conclusion, we hope we raised your awareness of:

- *The need to create **collaborative relationships** between **science outreach & teacher stakeholders**.*
- *The Power of **Outreach-Conscious Teachers** in being in a strategic position to promote a positive change in **science**, & the key role that **Teacher Educators** can take to help this happen.*

*[pedagogies (SCTA) that value student voice in **science industry/research experiences** to help create authentic science lessons and insight into science careers for teachers]*

*...to **enhance classroom science instruction & support STEM advancement.***





OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

Thank you



OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

Questions?



OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

References

Hurley, M., Butler., D., McLoughlin E., (2021). Immersive STEM Learning Experiences to Shape Shared Futures. Dublin: Dublin City University. DOI:10.5281/zenodo.5589759

Martins Gomes, D and McCauley, V. (2021). Creativity in Science: A Dilemma for Informal and Formal Education. Science Education, 1-23. <http://dx.doi.org/10.1002/sce.21614>

McCauley, V., Kealy, C., Hill O'Driscoll, E. and Flynn, P. (2023). "Yes, Biology is for me!": Raising the Science Capital of Boys. *Conference proceedings. New Perspectives in Science Education 2023*. 12th edition: Florence, Italy: Filodiritto Editore. 16-17 March 2023. https://conference.pixel-online.net/library_scheda.php?id_abs=5911

Stocklmayer, S. M., Rennie, L. J., & Gilbert, J. K. (2010). The roles of the formal and informal sectors in the provision of effective science education. *Studies in Science Education*, 46(1), 1-44. DOI: 10.1080/03057260903562284.



OLLSCOIL NA GAILLIMHĒ

UNIVERSITY OF GALWAY

