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Impact of Scholarship of Teaching and Learning: A guide for educators

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Impact of Scholarship of Teaching and Learning

A guide for educators

Shailey Minocha and Trevor Collins

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Acknowledgements

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We are grateful to Diane Ford (Senior Manager, Scholarship) and current[2] and past Directors[3] of eSTEeM[4], the OU Centre for STEM[5] pedagogy, for their support to Scholarship of Teaching and Learning (SoTL) in the Faculty of STEM over the last twelve years.

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Shailey is the author of the Badged Open Course (BOC), 'Scholarship of Teaching and Learning in STEM'[6], an open educational resource on OU's free learning platform, OpenLearn.

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6   'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.ac.uk/scholarship-of-learning-and-teaching-in-STEM
7   All the URLs (links) to webpages in this document were last accessed on 25 March 2023.

1. Introduction

Being pioneers in distance education and in online learning, the educators at The Open University (OU) have designed and implemented key innovations in teaching and learning and at scale for the last 53 years. The Scholarship of Teaching and Learning practice has been integral to teaching and learning innovations at the OU.

The Scholarship of Teaching and Learning or 'SoTL' involves conducting a focused, systematic investigation or inquiry into a well-defined aspect of academic practice, with the aim of improving learning and teaching. One or more research questions guide the way the research is designed and conducted in a SoTL inquiry. For example, a SoTL inquiry[8] conducted in the OU's Faculty of STEM had two key research questions: whether tutor feedback via video screencasts could help computing students develop skills in programming and problem-solving, and whether creating such screencasts was feasible as part of the normal tutor workload.

The impact of SoTL refers to demonstrable benefits to teaching and learning that are directly attributable to a SoTL intervention (or project). SoTL practice at the OU has been impactful as there has been a widespread adoption of the OU's distance learning methods and materials nationally and internationally in further and higher education.

In this 'guide' and in the accompanying materials, which we describe below, we report the outcomes of the impact evaluation of SoTL projects conducted in the OU's Faculty of STEM.

1.1   Impact evaluation initiative

The impact evaluation initiative has involved conducting impact evaluation of 16 SoTL projects in the OU's Faculty of STEM[9], 15 of which were funded and supported by eSTEeM[10], the OU Centre for STEM pedagogy, and one was supported by the School of Mathematics and Statistics.

The impact evaluation has involved applying an Impact Evaluation Framework (IEF) to each of these 16 projects to assess their impact. The IEF is included in **Appendix 1**. The 16 projects have been documented as case studies which focus on the impact of the individual SoTL projects, that is, what has changed because of each of these SoTL projects.

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8   Developing programming problem-solving skills using individualised screencasts, https://www.open.ac.uk/scholarship-and-innovation/esteem/projects/themes/technologies-stem-learning/developing-programming-problem-solving-skills-using or https://tinyurl.com/2xk8s4xt

9   Faculty of STEM, The Open University, https://stem.open.ac.uk/

10   eSTEeM, The OU Centre for STEM pedagogy, https://www.open.ac.uk/scholarship-and-innovation/esteem/

The impact evaluation initiative has three deliverables:

1. A compendium of 16 case studies which are in the accompanying document: 'Impact evaluation of Scholarship of Teaching and Learning: A compendium of case studies'[11]. The case studies and reflections on SoTL practice in each of these SoTL projects demonstrate the role of SoTL and its impact on educator's practice and on student learning.

2. A guide for educators (this document) and two supplementary workbooks.

3. The 'Executive Summary'[12] provides an overview of the initiative, this 'guide' and the 'compendium' of case studies.

The impact evaluation of the 16 SoTL projects and subsequent analyses and literature review has resulted in several outputs that are captured in this 'guide'. The guide includes:

• the identification of key enablers and strategies for the generation of impact;

• an understanding of eSTEeM's role in supporting SoTL in STEM at the OU;

• a toolkit for planning, generating, monitoring, and communicating impact from SoTL; and

• a list of challenges to generating impact of SoTL.

In the next section, we give details of the terminology used in this document.

1.2   Terminology

This document – 'Impact of Scholarship of Teaching and Learning: A guide for educators', is referred to as the **'guide'**. The supplementary resources to this guide are referred to as **'workbooks'**.

The accompanying document 'Impact of Scholarship of Teaching and Learning: A compendium of case studies' is referred to as the **'compendium'**.

The terms **'SoTL inquiry'**, **'SoTL project'**, **'SoTL initiative'** or **'intervention'** for a SoTL research project have been used interchangeably in the compendium and the guide.

SoTL is often carried out collaboratively; for example, a project team may be constituted by academics and learning designers, academics of different disciplines, a team of learning designers, an educational researcher, a librarian, a media developer, or a member of the careers and employability service working alongside an academic. The term **'educator'** in this guide implies any of these roles conducting a SoTL inquiry or project individually or in collaboration with others. In this context, an 'educator' is a **'SoTL practitioner'** or a **'SoTL researcher'**.

A **'project team'** implies a group of educators conducting a SoTL project collaboratively, led by one or more **'project leads'**.

11   Minocha, Shailey and Collins, Trevor (2023). *Impact of Scholarship of Teaching and Learning: A compendium of case studies*. The Open University, Milton Keynes, UK, https://doi.org/10.21954/ou.ro.000155c0

12   Minocha, Shailey and Collins, Trevor (2023). *Impact of Scholarship of Teaching and Learning: An Executive Summary*. The Open University, Milton Keynes, UK, https://doi.org/10.21954/ou.ro.000155bf

The term **'educator'** is also used in this guide to imply any of the roles detailed above that support learning and teaching and student journey in an institution.

The OU's model of 'supported open learning' involves students being supported by their **'Associate Lecturer'** or **'tutor'** in connection with the module[13] and student learning and progress in the module. The terms Associate Lecturer (AL) and tutor have been used interchangeably in the guide.

Finally, the authors of the compendium and guide are referred to as the **'authors'**. One of the authors conducted the impact evaluation of the 16 SoTL projects and liaised with the project teams/leads to develop the narratives or case studies of impact. This author is referred to as the **'impact evaluator'** in the guide when describing the process of impact evaluation and case study generation.

1.3   Resources: supplementary materials

Along with this guide, we have developed two resources[14] as 'workbooks' which the SoTL community may find useful.

- The **'Planning for SoTL impact workbook'** has been designed around the 'Theory of Change'[15] to guide the educator to systematically plan a SoTL project for possible impact. Once a project has been formulated, this workbook can act as a tool for project management, for engaging stakeholders, and for monitoring the impact of the SoTL inquiry.

- The **'SoTL impact evaluation workbook'** is designed around the IEF to conduct impact evaluation of SoTL projects. This workbook can be used by educators for planning, reflecting on, monitoring, and evaluating impact of a SoTL inquiry, and recording the evidence of the impact.

We will bring these two supplementary materials together with other resources into a **'Toolkit for SoTL impact'** in **Section 7** of this guide.

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13   A module is the basic building block of Open University study. Modules usually take 9 months to complete. On successful completion of a module, a student earns credits. Students can study a module on its own, or they can study multiple modules to work toward a nationally recognised qualification such as a certificate, diploma, or degree.

For more details, please see: Frequently asked questions, How OU study works, https://www.open.ac.uk/courses/what-is-distance-learning/faqs

14   The two supplementary resources are available along with the guide at: Minocha, Shailey and Collins, Trevor (2023). *Impact of Scholarship of Teaching and Learning: A guide for educators*. The Open University, Milton Keynes, UK, https://doi.org/10.21954/ou.ro.000155c1

15   Centre for Theory of Change, https://www.theoryofchange.org/what-is-theory-of-change/

2   Scholarship of Teaching and Learning (SoTL)

The Scholarship of Teaching and Learning or 'SoTL' is defined[16] as a systematic and ethically reasoned investigation of aspects of teaching and student learning by applying disciplinary knowledge, resulting in reflections and outcomes that are publicly shared for peer review.

Educators often employ a disciplinary lens (theoretical and methodological) when conducting SoTL research on the efficacy of student learning. A SoTL inquiry is, therefore, theoretically grounded and methodologically diverse, and involves educators reconsidering their long-held pedagogical theories and practices within the context that they are investigating.

Hutchings and Shulman (1999, p. 14) assert that SoTL is not synonymous with excellent teaching, but it is a condition for excellent teaching:

…the scholarship of teaching is a condition - as yet a mostly absent condition - for excellent teaching. It is the mechanism through which the profession of teaching itself advances, through which teaching can be something other than a seat-of-the-pants operation, with each of us out there making it up as we go. As such, the scholarship of teaching has the potential to serve all teachers - and students.

SoTL involves educators moving beyond reflection upon their teaching strategies to an intentional, rigorous and systematic inquiry to investigate teaching practices and pedagogical strategies for student learning, and engagement which generates evidence about efficacy of academic practice. When disseminating, SoTL researchers provide rich details about the context of their inquiry for peer review and critique, and to enhance the likelihood of other researchers building upon their research and pedagogical knowledge (Gayle, 2018).

Shulman (1999, p. 15) describes the attributes of SoTL:

An act of intelligence or of artistic creation becomes scholarship when it possesses at least three attributes: it becomes public; it becomes an object of critical review and evaluation by members of one's community; and members of one's community begin to use, build upon, and develop those acts of mind and creation.

Shulman (1999, p. 15) states the responsibility of a SoTL practitioner to make the SoTL research available to others in the community:

But the real reason that publication [in SoTL] is important is that scholarly acts must be made available for public scrutiny. They have to become community property or they will not contribute to the larger profession, as scholarship must.

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16   'Scholarship of Teaching and Learning' *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109160&section=1

SoTL research is distinct from educational research. Educational research is conducted by scholars whose discipline is Education and tends to rely on more traditional education or social science research methods, often quantitative. SoTL is typically a form of practitioner research where educators want:

> *to deepen their understanding of their teaching practices and to improve the quality of their student learning*
> (Stierer and Antoniou, 2004, p. 275).

SoTL, unlike educational research, embraces diverse approaches to conducting reflection and research on teaching and learning, including situating the inquiry in one or more disciplines, and builds a cross-disciplinary evidence base for effective pedagogical practices. Further, SoTL research involves inclusive partnerships such as between academics, learning designers, content creators, media developers, data analysts, tutors, educational researchers, librarians, and students.

SoTL as a field is maturing and is becoming more visible through dissemination. SoTL has the potential to make a much greater impact on the quality of curriculum and pedagogical practices, and on the adoption of emerging educational technologies in diverse disciplinary contexts than ever before[17].

2.1   Why engage with SoTL?

Shulman (2002, p. vii) refers to SoTL as 'a concept of moral action, aimed at cultural change' and a 'pedagogical imperative':

> *...an educator can teach with integrity only if an effort is made to examine the impact of his or her work on the students. The "pedagogical imperative" includes the obligation to inquire into the consequences of one's work with students. This is an obligation that devolves on individual faculty members, on programs, on institutions, and even on disciplinary communities.*

There is, thus, an obligation on individual educators, institutions and even on disciplinary communities to systematically engage in critical questioning via/in SoTL on academic and institutional policies and practices that have an impact on student learning (Gilpin, 2011).

Integrating SoTL in an educator's academic practice is essential because improving the quality of student learning requires an evidence-based approach. Systematic and rigorous investigation of learning and teaching via SoTL is a critical prerequisite to respond to major challenges facing higher education (HE) worldwide.

Corradini (2022) argues that adoption of scholarly practices in teaching enables educators to drive forward curriculum enhancement and innovation, to develop an ability to use data to improve the student outcomes, and to share their expertise of creating positive outcomes for the student learning experience.

SoTL practice should be integral to every educator's profile/role and not just those educators who have 'teaching' appointments or those who are based in Schools of Education. Kensington-Miller *et al.* (2021, p. 4) state:

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17   Why do you do SoTL?
     https://illinoisstateuniversitysotl.wordpress.com/2015/03/02/why-do-you-sotl/

> *…SoTL scholarship is at the core of an institution's teaching and learning mission and the purpose of higher education.*

Draeger (2013, p. 17) states that for educators, it is engaging with the process of SoTL which is important rather than the level of impact:

> *Like a vigorous free press, SoTL scholars ask tough questions, take the time to gather evidence, and offer informed views. In this way, SoTL can inform policy conversations. Finally, SoTL matters even when it does not directly transform institutional policy, because SoTL reflects a spirit of pedagogical innovation that enlivens the quest for learning and reminds us why it is worth pursuing.*

There is a fundamental link between teaching and learning and key educational imperatives and challenges in HE such as academic excellence, student success, employability, internationalisation, innovation, equality of opportunity and widening participation. Hence, the value of SoTL and impact of SoTL is not just on learning and teaching enhancement but on all these vital aspects of student success and experience within the institution and beyond.

Further, SoTL enhances the sense of belonging among students who recognise that the curriculum and delivery of teaching is informed by research, and that SoTL is a vehicle that continually aims to improve teaching and learning.

SoTL practice may influence career development, promotion and recognition of teaching excellence of educators (Fanghanel *et al.,* 2015*).* The teaching-only or education-focused contracts in UK universities have been steadily increasing in the last five years. Unlike research career pathways, for educators on education-focused contracts[18] there is quite a variation across the HE sector on the promotion criteria, career progression and support for professional development (Smith and Walker, 2022). Similarly, early career academics experience the pressures of disciplinary research and are often unsupported in their long-term professional development as teachers or educators[19].

One of the ways for career progression of educators on education-focused contracts and for early career educators to transfer their curiosity of disciplinary research to their teaching is to engage in SoTL. An educator at the OU shared her experiences of engaging in SoTL:

> *It [SoTL] compensated for not having any research element in my contract and more importantly gave a sense of achievement as it utilises many of the same skills and knowledge while improving the student experience and helping meet Faculty and University goals.*

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18   Leading education-focused career development: towards a common understanding of scholarship and its outputs, https://thesedablog.wordpress.com/2021/11/17/leading-education-focused-career-development/. Also, see: Stratification, Centralisation and the REF – The changing face of the UK university workforce, https://blogs.lse.ac.uk/impactofsocialsciences/2022/05/12/stratification-centralisation-and-the-ref-the-changing-face-of-the-uk-university-workforce/ or https://tinyurl.com/3eeznztx

19   Developing pedagogical content knowledge through the integration of education research and practice in higher education, https://thesedablog.wordpress.com/2022/10/05/developing-pedagogical-content-knowledge-through-the-integration-of-education-research-and-practice-in-higher-education/ or https://tinyurl.com/y49bfnnt

Cornejo-Happel and Song (2020) found that those experienced in SoTL stated that tangible outputs, such as peer reviewed research publications, were an important factor for their continued engagement in SoTL. The publications helped them to meet the targets or expectations of dissemination while deepening their understanding of learning and teaching. In their study, those new to SoTL indicated an interest in developing knowledge and research skills beyond their disciplinary areas as an important motivator to commit to collaborative SoTL.

In fact, a SoTL practitioner associated with eSTEeM reflected on her skills development and echoed the findings of Cornejo-Happel and Song (2020):

> *It [eSTEeM-funded SoTL] has made me engage with qualitative methods that I hadn't previously been exposed to, and knowledge of these has helped me in other contexts.*

Engagement with SoTL can be transformative and can result in a clearer understanding of evidence-based educator practice and student learning, leading to better student outcomes[20]. Further, the research skills gained in SoTL practice can be applied in disciplinary-based research.

However, engaging with SoTL can be challenging, particularly for STEM educators (as we have found at the OU). SoTL requires shifts in understanding and ways of conducting research, which are different from disciplinary norms and beliefs. SoTL often requires educators to engage with methodological frameworks in social sciences research and pedagogical frameworks in the discipline of education that may fall outside their disciplinary training. In the next section, we discuss some of the other barriers to conducting SoTL.

2.2   Barriers to conducting SoTL

Barriers to SoTL practice include institutional challenges such as a lack of encouragement or recognition for SoTL, and a lack of funding to undertake and disseminate a SoTL inquiry. SoTL is often perceived as an individual pursuit of some personal interest or a project by the side, rather than 'real' research (Botnaru *et al.,* 2022), and the existing dominant belief typically is that those who cannot succeed in disciplinary research teach or resort to SoTL (Mighty, 2013).

Since the COVID-19 pandemic, it has become even more challenging for educators to engage with SoTL. The HE sector is in a state of flux. Educators have been dealing with a constant stream of uncertainties and unpredictable problems in delivery and assessment. Consequently, finding time to engage in SoTL, conducting it in hybrid settings, and fewer opportunities for face-to-face networking to build collaborations are some of the challenges that educators are facing in conducting SoTL.

Evaluation of teaching is not a part of the disciplinary identity of most educators. Further, educators may not be trained or skilled enough to set up a SoTL inquiry on their own. Setting up an inquiry, choosing research methods, preparing for ethical review by the institution's research ethics committee (Haigh *et al.,* 2011), analysing data, managing time for writing of publications, and finding collaborators within a discipline or across disciplines are some of the challenges that educators

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20   Having a name for it: SoTL's impact on my work, https://illinoisstateuniversitysotl.wordpress.com/2019/04/01/having-a-name-for-it-sotls-impact-on-my-work/

may face when embarking on SoTL practice for the first time. Conducting a collaborative SoTL inquiry with an experienced SoTL practitioner and having a mentor can help to gain expertise and confidence.

To facilitate the uptake of SoTL for educators, the OU's Faculty of STEM has developed a free Badged Open Course (BOC)[21] on the OU's free learning platform, OpenLearn. The OU's BOC on SoTL establishes the definition of SoTL and has been designed to help colleagues to gain the knowledge, skills, and confidence to plan and conduct a SoTL inquiry. The case studies in this course are from STEM but the course has been designed for colleagues from all disciplines who are interested in integrating SoTL in their academic practice, in gaining professional recognition such as HEA Fellowships[22], and for career progression on teaching-only contracts.

In addition, the BOC introduces an Impact Evaluation Framework (IEF) that can be applied by educators to plan and evaluate the impact of their SoTL projects. The twelve criteria in the IEF (discussed in **Section 3** and detailed in **Appendix 1**) can be aligned with the promotion criteria for education-focused contracts and can help guide the collection of evidence for teaching enhancement.

2.3   SoTL at The Open University

At the OU, pedagogical research and SoTL guide a continuous improvement of pedagogy to enrich the student experience, develop research-informed curriculum, and provide the evidence base that underpins learning, teaching, and assessment. Following the adoption of a university-wide Scholarship Plan[23] in October 2018 and the creation of Scholarship and Innovation Centres in each of the faculties of the OU[24], there is an increasing focus on SoTL for evidencing excellence in teaching and learning. In fact, SoTL is integral to the OU's Teaching and Learning Plan (2022-2027)[25] and is embedded in one of its principles:

Principle 5: Teaching and learning are designed and delivered as an academically rigorous, research-informed process.

A couple of associated actions refer to the significance of SoTL activity:

5.3 Create enhanced opportunities for students, staff, and employers to actively engage with, and contribute more fully to, our research/scholarship communities and in external work-based learning settings.

5.6 Enable continuous review, evaluation, and innovation of our teaching, learning and student support through research and scholarship activity.

The OU's current Scholarship Plan runs until 2023, and a consultative process is currently underway through stakeholder workshops and surveys to inform the development of a new plan, to support the Teaching and Learning Plan (2022-2027), and to further enhance the impact of the OU's SoTL within the OU and beyond.

21   'Scholarship of Teaching and Learning *in* STEM', Badged Open Course (BOC), The Open University, https://www.open.ac.uk/scholarship-of-learning-and-teaching-in-STEM

22   Advance HE (HEA) fellowships, https://www.advance-he.ac.uk/fellowship/fellowship

23   The Open University Scholarship plan (2018-2023), https://www.open.ac.uk/blogs/FASSTEST/wp-content/uploads/2019/01/The-Scholarship-Plan-Final.pdf

24   Scholarship at The Open University, https://www.open.ac.uk/scholarship-and-innovation/esteem/working-with-us/scholarship-open-university

25   Teaching and Learning Plan, https://openuniv.sharepoint.com/sites/intranet-vice-chancellors-office/Pages/Teaching-and-Learning-Plan-22-27.aspx (requires OU staff login)

2.3.1 eSTEeM: Supporting SoTL in STEM at the OU

eSTEeM[26], the OU Centre for STEM pedagogy, has been supporting SoTL activity in STEM at the OU since 2010. eSTEeM celebrated its 10th anniversary in December 2020 through videos[27] and a report (Collins, *et al.*, 2020).

eSTEeM's aim is to deliver excellence for OU's students and contribute to the further development of STEM pedagogy within HE through SoTL. eSTEeM promotes reflective practitioner-led, evidence-informed SoTL in open and distance STEM education.

eSTEeM has provided funding to over 200 SoTL projects[28] that have systematically evaluated learning, teaching, assessment, and student support to improve the student experience. eSTEeM promotes the active involvement of students as partners[29] in SoTL practice.

eSTEeM has two project calls a year (in January and July) which invite project proposals addressing areas of strategic importance for the Faculty of STEM, the OU and UK's HE sector. The strategic priority areas are identified in collaboration with STEM School Scholarship Leads and eSTEeM's Student Reference Panel, and through consultation with university stakeholders such as the Scholarship champions in the Student Recruitment and Support Centre; Office of the Pro-Vice-Chancellor (Students); Quality Enhancement and Innovation Programme; and Careers and Employability Service.

eSTEeM supports professional development and practice in pedagogical research through a programme of events and resources to increase staff capacity to undertake SoTL. It promotes use of SoTL for professional accreditation, awards, rewards, and promotion cases. eSTEeM organises community events for SoTL skills development; an annual conference[30] that showcases SoTL outputs in workshops, demonstrations, poster sessions, and oral presentations; and SoTL events within the individual schools[31] of the Faculty of STEM throughout the year. In addition, it offers induction events for educators embarking on SoTL projects and maintains a mailing list of past and current project leaders, through which it sends updates.

eSTEeM provides a community to support SoTL practitioners in the Faculty of STEM. A SoTL community, just as eSTEeM has built over the twelve years, facilitates networking, and helps to overcome the sense of isolation amongst educators who may not be included in vital and up-to-date discussions about curriculum and student success because of their roles or positions in the institutional hierarchy (Simmons *et al.*, 2021). As a community of SoTL scholars, eSTEeM reinforces a sense of belonging and (academic) identity that is the foundation for collective learning and collaborative SoTL research.

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26 eSTEeM, The OU Centre for STEM pedagogy, https://www.open.ac.uk/scholarship-and-innovation/esteem/
27 eSTEeM 10-year anniversary videos playlist, https://www.youtube.com/playlist?list=PLElx40m5tAJt84b_TWOxmakZU8tCrHa1K or https://tinyurl.com/57r6x9au
28 eSTEeM projects, https://www.open.ac.uk/scholarship-and-innovation/esteem/projects
29 Students as partners in Scholarship, https://www.open.ac.uk/scholarship-and-innovation/esteem/working-with-us/students-partners-scholarship
30 For example: The 12th eSTEeM Annual Conference: Enabling Student Success – Expanding Engagement in Scholarship, https://www.open.ac.uk/scholarship-and-innovation/esteem/events/12th-esteem-annual-conference-enabling-student-success---expanding-engagement-scholarship or https://tinyurl.com/4ye4w3uw
31 Schools and Institute, Faculty of STEM, The Open University, https://stem.open.ac.uk

An OU educator has reflected on her experiences of being a member of eSTEeM's community:

❝

Working on eSTEeM projects has helped me to build links with colleagues in other schools, and think about wider educational issues. **❞**

eSTEeM also facilitates the pairing of project mentors and mentees on SoTL projects. Every eSTEeM project team is offered a mentor. eSTEeM provides guidance and training to new SoTL mentors, which covers topics such as what mentoring of SoTL research involves, expectations of mentoring relationships, skills of questioning and listening and working through typical scenarios of the challenges that mentees may face and the strategies that mentors could adopt to support the mentees.

Events run by eSTEeM facilitate networking opportunities for connecting with colleagues with different disciplinary backgrounds within the OU and with other academic institutions who share an interest in pedagogical research. Within the OU, eSTEeM supports STEM practitioners' engagement and participation in pan-university scholarship. eSTEeM provides seed corn funding for collaboration and knowledge exchange activities (for example, visits, meetings, and events in the UK).

eSTEeM further supports the dissemination of findings from SoTL projects within the OU and externally through national and international networks and events, thereby enabling the engagement of the SoTL practitioners with the wider community to exchange good practice.

As **Figure 2.1** shows, eSTEeM performs several functions to support SoTL in STEM and cross-disciplinary collaborations across the university, nationally and internationally. An eSTEeM project lead shared her experiences:

❝

The eSTEeM projects I led had a positive impact on my career development, and led to publications, recognition, promotions and leadership roles, and further collaborations internally and externally. **❞**

Engaging in SoTL with eSTEeM's support has helped in the development of vital research skills and confidence for engaging in innovative pedagogical interventions and in career progression. Two educators involved in SoTL projects in the OU's Faculty of STEM reflected on their experiences:

❝

… eSTEeM gave me the pedagogical confidence to explore and innovate in my teaching.

…helped in securing promotion to senior lectureship; coalesced thinking around the topic under consideration, informing module production and work I want to push further through into my School's curriculum. **❞**

Through providing support to the other three relatively new centres of SoTL at the OU, eSTEeM has helped in building a SoTL community across the OU and enhanced the institutional capacity for SoTL.
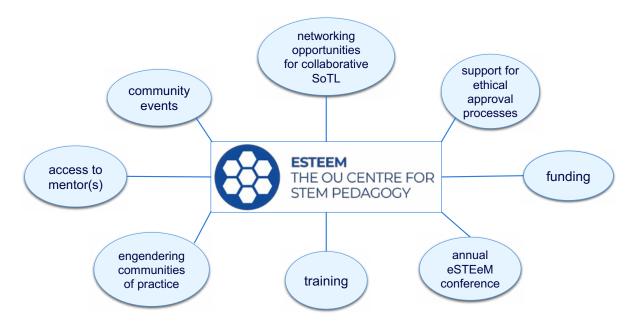
Figure 2.1 Role of eSTEeM in supporting SoTL activity

3.   Impact of Research

Research impact is defined as demonstrable and/or perceptible benefits to individuals, groups, organisations and society (including human and non-human entities in the present and future) that are causally linked (necessarily or sufficiently) to research (Reed *et al.*, 2021). UK's Research Excellence Framework (REF) defines impact as 'an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia'[32].

Impact is important in all research as it helps to ensure the best possible return from public and private investment in the university sector. Impact helps researchers to focus on the purpose of research, rather than just the process of research.

Research impact matters to individual researchers because impact matters to funders. Research funding bodies are under pressure to audit and evaluate the investments they are making. Funders ask researchers to identify the 'relevant end users' of their research beyond academia and to outline how their research will make demonstrable contributions to the society and the economy.

For educational institutions, being able to showcase their impact is important to prove they are world-leading in research and to attract funding, students, and researchers. The way impact is understood, captured, and communicated can influence decision-making related to policy, strategy and funding and academic practices. Impact is now a key component of an institution's research culture.

Running a workshop, producing a report or a poster are activities that help towards achieving the change, but they don't represent a change in themselves. These outputs are pathways towards delivering a change and subsequent impact. Therefore, whilst knowledge exchange and public engagement may lead to impact, unless there is evidence to suggest that a real change occurred, it is not possible to claim knowledge exchange and public exchange activities as impact in themselves (Seale, 2021).

A possible route of four stages to achieving impact is suggested in the Research Mobilization blog[33]:

Reach: Communication of knowledge to key stakeholders who would benefit from the research is key to impact. It is important to shape the communications as per the target audience.

Engage: Interacting with stakeholders – whether they are policy makers, from the industry, educators, the media, or the public – to understand their needs and to be able to address their feedback as research evolves.

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32   How Research England supports research excellence, https://www.ukri.org/about-us/research-england/research-excellence/ref-impact/
33   What is knowledge mobilization? or, how do I develop the impact potential of my research? http://blog.growkudos.com/research-mobilization/what-is-knowledge-mobilization

Change: Early in the research process, it is important to think about the possible impact of the intervention – what will the intervention change?

Amplify: How significant will be the change? Will it benefit the local context and local community, and could that benefit be transferred to other contexts and communities at national and international levels?

In the next section, we discuss what the impact of SoTL implies.

3.1   Impact of SoTL

The impact of a SoTL inquiry implies demonstrable benefits to learning and teaching that are directly attributable to that project. Generating impact is integral to SoTL practice and comes more naturally than disciplinary research as SoTL is oriented towards improving the student experience and student outcomes. It is important that the knowledge generated via SoTL is shared within the institution and with external colleagues so that the project's reflections and outcomes can be peer reviewed, appraised, and taken up by other educators.

When formulating the research questions of a SoTL inquiry, it is important for a practitioner to plan for impact by asking: Why am I doing this project? What do I want to change because of this SoTL inquiry? How this inquiry has the potential to make a difference, albeit on a small scale? Do I know the processes by which I can bring about a change in the policy in the institution because of this SoTL inquiry?

Impact of SoTL answers the questions: what has changed because of this SoTL inquiry? What new insights will other educators gain from this SoTL inquiry? How can the institution put the outcomes of the inquiry into use? What are the current or emerging debates in HE that this inquiry contributes to?

Impact is, therefore, not an outcome or result at the end of a SoTL intervention. Impact is linked to ongoing change. The impact of a SoTL inquiry can be one or more of these aspects:

- improvement in student experience
- contribution to teaching strategies in the discipline or subject area
- application of the outcomes of the SoTL inquiry in other disciplines and contexts
- changes in institutional processes and policies
- higher quality of learning and teaching at institution, national and international levels
- strengthening student-staff collaborations through student partnership
- building or strengthening SoTL practitioner's reflective practice
- professional development and career progression of the SoTL practitioners.

SoTL has an impact on the personal and professional development of the involved educators, students, and associated stakeholders. The impact of SoTL, therefore, extends beyond improving the quality of curriculum and pedagogical practices.

3.1.1 Impact on the SoTL practitioner

SoTL has a direct impact on the practice of an educator[34]. SoTL brings the researcher mindset into teaching and provides the educator with the research language and methodology for reflection and evidence-based exploration to improve student learning (Shaffer *et al.*, 2019).

Weston and McAlpine (2001) proposed a three-phase continuum for the growth and development of a SoTL practitioner.

- Growth in one's own teaching, when educators begin to see teaching and reflective practice as an essential and engaging aspect of their role, rather than an interference with their disciplinary research.

- Growth in dialogue with others about teaching and learning in the discipline, which helps to create communities of educators who share their teaching experiences in their discipline. Educators can integrate knowledge of the subject matter with their knowledge of how to teach it. They start recognising the value of reflective academic practice and take increasing responsibility for enhancing the value of teaching within their departments and faculties.

- Growth in SoTL implies developing scholarly knowledge with substantial impact in both the disciplinary and institutional settings. In this phase, educators share their expertise and knowledge gained via SoTL to make an impact within the institution and the discipline.

This three-phase continuum reflects the growing maturity of a SoTL researcher and the positioning and impact of SoTL within an institution. Although educators may move through this continuum of development on their own, support through mentoring, training, workload planning for SoTL and funding can facilitate (and expedite) their development.

Shaffer *et al.* (2019) reported that SoTL activity creates synergy between research and teaching and enables educators to move outside of traditional silos and into new communities that SoTL helps to create. Although maintaining both a SoTL and discipline-specific research agenda for educators could be demanding, the rewards can be transformative as SoTL can strengthen educators' teaching in their disciplines. The qualities of integrity, perseverance, and courage of SoTL practitioners will help to grow and sustain SoTL practice (Glassick *et al.*, 1997).

To determine whether a SoTL project has had an impact and what that impact is, appropriate evidence or data needs to be collected. An evaluation of impact involves investigating the nature of the impact and the evidence for that impact.

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34 'The impact of SoTL on the practitioner', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109326&section=2.2

3.2   Impact evaluation of SoTL

Evaluation[35] is systematic assessment of an intervention to understand how it is being or has been implemented and what effects it has had, for whom and why. It also comprises identifying what can be improved and how, as well as estimating overall impact and cost-effectiveness. The evaluation data or evidence can help inform decisions on whether to continue an initiative, how to improve it, how to minimise risk, or whether to stop and invest elsewhere.

An impact evaluation is typically referred to as an objective test of what changes have occurred, the scale of those changes and an assessment of the extent to which they can be attributed to the intervention. Research impact evaluation is defined as the process of assessing the significance and reach of both positive and negative effects of research (Reed *et al.*, 2021). The *significance* of an impact can be defined as the magnitude or intensity of the effect of research on individuals, groups, or organisations. The *reach* of an impact can be defined as the number, extent or diversity of individuals, groups or organisations that benefit from research.

Similarly, the impact of SoTL activity can be judged against two criteria: significance and reach. First, how significant are the benefits of the SoTL inquiry and for whom? Second, how far-reaching are the outcomes of the SoTL inquiry? An evaluation for impact will involve finding out who has benefited from SoTL and how, and to collect evidence related to significance and reach.

Mark Reed suggests[36] to start small, focus on significance in the first instance and then move on to extend the reach:

Start small, and once you can see that it works (and only then), ask how you might be able to extend the reach of your impact.

Impact evaluation is not the same as process evaluation. Process evaluation[37] typically involves questioning and analysing whether an intervention is being implemented as intended; whether the research design is working; and what is working well and why.

An impact evaluation process assesses the changes that can be attributed to a particular intervention, project, or a programme of work. Evidence of impact is the communication or demonstration of impact based on robust evaluation (Reed *et al.,* 2021). Impact evaluations are integral to evidence-based policy making. A strategic approach to impact and its evaluation is important to ensure the value of any impact is communicated to beneficiaries and is linked to policymaking.

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35   The Magenta Book, HM Treasury guidance on what to consider when designing an evaluation, https://www.gov.uk/government/publications/the-magenta-book
36   'What is impact?', Fast Track impact, https://www.fasttrackimpact.com/what-is-impact
37   The Magenta Book, HM Treasury guidance on what to consider when designing an evaluation, https://www.gov.uk/government/publications/the-magenta-book

The challenge in carrying out an effective impact evaluation is to identify the causal relationship between the project or programme and the outcomes of interest. Mark Reed says the following in a tweet[38] related to impact evaluation:

[Impact] Evaluation design is equal to research design!

Ask yourself "what's my impact" as a research question and identify methods to answer it. Don't be afraid to ask for help!

The role of impact evaluation of SoTL is to:

- Be an essential tool for accountability, showing the outcome of funding and other resources invested in SoTL research and, thereby, guide the choices for future investment. There may be a need for funding providers to demonstrate the impact of their funding for accountability.

- Provide insights on whether and how SoTL is contributing towards addressing emerging challenges in the institution and in HE.

- Provide a rich evidence base to inform strategic decisions about priorities for funding and supporting SoTL across different disciplines.

- Provide evidence which can be used by managers to inform decisions on resource allocation (for example, workload management, funding, staff development and training).

- Create a strong performance incentive for universities and for individual educators.

The impact evaluations in SoTL primarily investigate the experiences of and changes in students and their learning in relation to the SoTL project. Evidence of impact, therefore, typically relates to *students*: for example, their learning, assessment scores, experience, attainment, progression, retention; and so on. In addition, the evidence relates to the impact on *educators*: for example, their academic practice, professional development, career progression, and so on.

In the next section, we outline a few frameworks that can be applied to conduct the impact evaluation of SoTL research.

3.2.1 Impact evaluation frameworks for SoTL

In this section, we briefly describe some frameworks that can be applied to guide the impact evaluation of SoTL and provide a brief critique related to their suitability for evaluating individual SoTL projects.

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38   Evaluation tip of the week by Mark Reed, https://twitter.com/methods4change/status/1483477836291661829?s=20&t=5cU4UBUx7kbgN5hHcJaq1g or https://tinyurl.com/4ckasdz2

The 4M framework

The 4M framework (**Figure 3.1**) is an analytic tool for determining impact at one or more of the following four levels (Simmons, 2020; Pechenkina, 2020):

1. *Micro*: at an individual researcher level or within one classroom
2. *Meso*: at departmental level or programme wide
3. *Macro*: at an institutional level or spanning departments
4. *Mega*: at a disciplinary or interdisciplinary level, or national level or international levels.

For example, an evaluator could use the 4M framework as a question prompt to explore the impact of a SoTL project (Simmons, 2020): what is the impact of the SoTL project at the micro-meso-macro-mega (4M) levels?

Although the 4M framework is useful for exploring and communicating the progression of SoTL practice and impact of a SoTL project across the four levels, it doesn't list out explicit criteria for analysing the impact of a SoTL project and for collecting evidence at each of the four levels.

The 4M framework is nevertheless a useful guiding framework to categorise the impact for communication once it has been evaluated and analysed. Further, the 4M framework can serve as a useful guide for planning the dissemination of outputs[39] from a SoTL project.
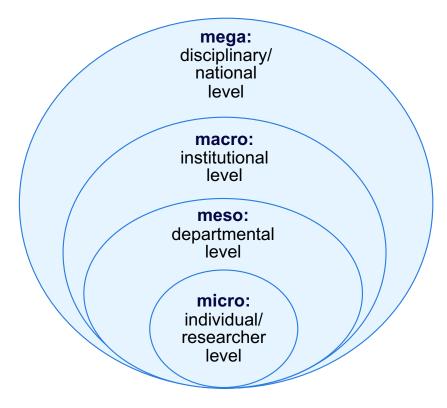

Figure 3.1 4M framework of SoTL's impact

39 'Dissemination', Scholarship of Teaching and Learning, The WATT WORKS quick guides, https://lta.hw.ac.uk/resources/scholarship-of-teaching-and-learning/

EDIN Impact Analysis Tool

The Educational Developers in Ireland Network (EDIN) has developed an online reflective tool, EDIN Impact Analysis Tool[40], for planning and evaluating the impact of educational development activities. EDIN supports academic developers with the planning of research around one or more interventions and for collating evidence of the impact of their work.

EDIN's audience is academic developers (sometimes called educational developers or faculty developers) who have a remit to work with staff (primarily academics) to lead and support the improvement of student learning. The academic developer helps to develop the capabilities of academic staff and improve educational methods and processes. Academic developers are typically based in centralised Teaching and Learning units, working primarily with staff (rather than students) who wish to enhance or develop some aspect of their practice through professional learning of some form (Gormley, 2021).

SoTL: Areas of impact

Ciccone (2008) has proposed the following 10 areas of impact of SoTL.

1. SoTL contributes to important agendas and initiatives in higher education.
2. SoTL changes how teachers teach and contributes to our knowledge of the factors that make change happen.
3. SoTL changes how we understand and talk about learning.
4. SoTL has direct and indirect effects on student learning and success.
5. SoTL contributes to our knowledge of the conditions that affect the exchange and improvement of pedagogy.
6. SoTL strengthens development programs for higher education professionals.
7. SoTL informs changes in the policies and procedures of the institution.
8. SoTL affects the culture of academic life.
9. SoTL leads to changes in how we define and evaluate scholarship.
10. SoTL is growing and evolving as a movement.

This list of areas of impact of SoTL captures the essence of SoTL – its meaning and role in improving academic practice and student learning. However, these areas are at a high-level and not sufficiently concretised as attributes to guide the impact evaluation of SoTL projects.

Impact in terms of key stakeholder groups

eSTEeM categorises the impact in its yearly Business Plan in terms of the key stakeholder groups that eSTEeM impacts on: at the level of the institution (Pro-Vice Chancellor PVC-Students Access, Participation and Success team; Scholarship Steering Group; Scholarship and Innovation Centres); faculty (STEM Executive and Deanery); schools (Head of School, Director of Teaching and Scholarship Leads); practitioners (that is, individual academics, Associate Lecturers and academic-related staff); and students.

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40   EDIN Impact Analysis Tool, https://www.edin.ie/?page_id=384

eSTEeM, therefore, categorises impact in five types to evaluate its impact:

1. *Institutional impact:* To contribute to the development of the University of Scholarship Plan 2023-2028 and support pan-university scholarship programme.

2. *Faculty impact:* To develop a culture of collegial cross-disciplinary scholarship to inform teaching and learning practices in STEM.

3. *School impact:* Innovation in teaching and learning informed by an improved understanding of the factors influencing student participation and performance.

4. *Practitioner impact:* Opportunities for professional and career development through engagement in SoTL.

5. *Student impact:* Improving the student experience and developing opportunities for student engagement in SoTL.

This framework is useful for investigating the impact of the support that a Centre or an institution provides to SoTL but lacks the operational detail to analyse impact of individual SoTL projects.

The Impact Management Planning and Evaluation Ladder (IMPEL)

The IMPEL model[41] provides a framework for describing different types of change that can be achieved through educational development activities. Each stage, or ladder rung, is incrementally broader in impact than the last. The different stages are:

1. Changes for project team members.

2. Changes by project team members leading to changes for students who are directly influenced.

3. Contributions to knowledge in the field; growth or spread of disseminated ideas; serendipitous adoption/adaptation by people beyond the project's intended reach.

4. Changes by opportunistic adopters at participating institutions leading to changes for students who are directly influenced.

5. Systemic changes at participating institutions leading to changes for all relevant students.

6. Changes by opportunistic adopters beyond participating institutions leading to changes for students who are directly influenced.

7. Systemic changes beyond participating institutions leading to changes for all relevant students.

The IMPEL model is an extended version of the 4M model and has been specifically designed for educational development projects. Like other impact evaluation frameworks discussed in this section, IMPEL offers a prompt for project teams in the planning, execution, and reflection stages of projects, and a cogent framework for funding agencies to outline expectations, make funding decisions and evaluate

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41   The Impact Management Planning and Evaluation Ladder (IMPEL), https://www.education.gov.au/learning-and-teaching/resources/impact-management-planning-and-evaluation-ladder-impel

the efficacy of funding in facilitating strategic educational change[42]. The questions and matrix in the IMPEL model provide a structure to prompt active and ongoing consideration and re-evaluation of impact and how it may be maximised given the evolution of the project.

However, IMPEL doesn't offer explicit attributes or metrics for evaluation of a SoTL project. Further, IMPEL's emphasis is on the adoption of an initiative in other contexts (that is, transfer). It defines 'transfer' as 'the processes undertaken to maintain momentum and impact beyond the funded life of the project and beyond the project team'[43].

Rubric for measuring the impact of SoTL

Pechenkina (2020) has proposed a rubric for evaluating the impact of SoTL. The rubric has four types of impact and the corresponding metrics. The four types of impact are:

1. Improved learning (student experience)

2. Improved teaching (lecturer experience)

3. Results disseminated

4. Strengthened institutional profile

The levels of impact range from that achieved within an individual classroom to a broader impact. The metrics proposed to determine the extent of each type of impact can be used as evidence regardless of the level of impact analysed. The author reports evaluation of three SoTL projects in (Pechenkina, 2020) to conduct a preliminary testing of the rubric and its feasibility for evaluating SoTL impact.

At the OU, we have developed an Impact Evaluation Framework for SoTL, which is more detailed than the rubric in Pechenkina (2020) and which we now discuss.

Impact Evaluation Framework

Based on a literature review and a decade's experience of SoTL practice in eSTEeM, an Impact Evaluation Framework (IEF)[44] consisting of a set of 12 impact criteria has been developed for SoTL (Minocha, 2021). These criteria can be useful for planning for impact when designing a SoTL inquiry, for evaluating the impact of a SoTL inquiry, or for guiding the collation of evidence when evaluating the impact of SoTL activity at the institution level.

The 12 criteria or facets of impact and their attributes are as follows:

1. *Student experience*: pre-registration; induction; curriculum design; design of assessment; learning design; student engagement with course content; student engagement with the technological intervention; and student satisfaction rate.

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42 AAEE Engineering Education Grants, https://aaee.net.au/wp-content/uploads/2021/04/Final-AAEE-Engineering-Education-Grants_19.04.2021-1.docx (**downloadable Word file**)

43 The D-Cubed Guide: Planning for Effective Dissemination, https://ltr.edu.au/vufind/Record/365631

44 The impact evaluation framework for SoTL has been shared under Creative Commons licence: Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0), https://creativecommons.org/licenses/by-nc-sa/4.0/

2. *Student retention and progression:* student registrations; average marks as compared with previous year(s); module completion rate; module pass rate; student retention rate; and student progression.

3. *Evidence-based excellence in teaching:* student skills-set (e.g. academic writing; critical thinking; reflection; problem-solving; group-working; digital literacy); student employability; evidence of research-informed teaching; data for assessments (e.g. UK's TEF[45]), programme reviews and accreditation processes; interdisciplinary collaborations in teaching; accreditation against professional standards; informing policy development internally at the level of department, faculty or University; and informing policy development externally (in another institution or in the sector).

4. *Influence on discipline-based teaching, research and practice:* change in the ways in which subject concepts are taught; interest/confidence in discipline-based research; interdisciplinary collaborations in research; uptake of outputs in industry practice.

5. *Dissemination:* number of publications from the project/initiative and impact factor of individual journals/conferences; publications with students as co-authors; Google Scholar analytics or other institutional analytics (e.g., ORO[46] at the OU) on downloads of reports/publications; and sharing of novel research methods/strategies for conducting SoTL.

6. *Adoption of the outcomes by other educators:* adoption of the outcomes internally (within the institution) to improve assessment, curriculum design in the same discipline or in other disciplines; adoption of the outcomes externally (outside the institution) to improve assessment, curriculum design in the same discipline or in other disciplines.

7. *Enhanced mutual stakeholder understanding:* understanding among students, tutors, learning designers, IT support; for example, their skills, challenges, requirements; a community that SoTL creates and moving outside traditional silos.

8. *Personal and professional development of project team and associated stakeholders:* improved practice or personal knowledge; developing an analytical mindset; collaborative or team-working skills; reflective skills; becoming a mentor to others; becoming a champion for SoTL; continuity in SoTL activity by individual; students gain skills/expertise (e.g., research, team-working, dissemination) when involved as partners in SoTL.

9. *Recognition of project team members and other stakeholders:* career trajectory that can be attributed to SoTL such as promotions; fellowships or memberships of professional associations nationally and internationally (e.g. Advance HE fellowships[47]); invited speaker to events/conferences internally and externally; public recognition through publications, conference presentations; leadership roles related to teaching and membership of strategic committees; external examinership and membership of external bodies; public recognition via awards.

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45 About the TEF, Teaching Excellence Framework, https://www.officeforstudents.org.uk/advice-and-guidance/teaching/about-the-tef/
46 ORO – Open Research Online, https://oro.open.ac.uk/
47 Advance HE (HEA) fellowships, https://www.advance-he.ac.uk/fellowship

10. *Fostering of SoTL culture*: stimulating interest in SoTL; inspiring others to conduct SoTL; increased involvement of students in SoTL projects; a stronger overall faculty that values teaching and student learning; renewing/raising faculty excitement about teaching and making them more aware of how they teach; a move towards staff-student collaboration in curriculum design, development, and evaluation; recognition of SoTL at par with disciplinary research.

11. *Financial implications*: opportunities for income diversification; effect on costs of modules or programmes.

12. *Receipt of funding*: internal (within the institution) funding for follow-on/new projects based on SoTL project's success; external funding (from outside the institution) for follow-on/new projects based on SoTL project's success.

The IEF is included in **Appendix 1**. For the impact evaluation initiative that led to the case studies included in the compendium (Minocha and Collins, 2023) accompanying this guide, the IEF provided a common or a consistent structure or framework to conduct 'retrospective' impact evaluations of a selected set of 16 SoTL projects. The IEF was adapted as a question-driven form (see **Appendix 3**) to guide self-evaluation of impact by the SoTL project teams. The methodology of impact evaluation of SoTL using the IEF is outlined in **Section 4**.

3.3   Concluding remarks on SoTL's impact

SoTL needs to be integrated within the culture of an institution to ensure that SoTL informs pedagogical and curriculum changes (Webb and Tierney, 2020). In a dynamic and ever-changing HE environment, the priorities for SoTL will be increasingly dictated by immediate learning and teaching challenges in individual modules, school/department, unit/faculty, institution, or in HE. However, SoTL-active educators will have the expertise and experience to effect positive change in learning and teaching in both familiar and new contexts for themselves and for others.

During COVID-19 pandemic that necessitated unprecedented changes to teaching and learning in HE, Maurer (2022) discusses how SoTL-active educators were able to leverage their SoTL expertise, in conjunction with disciplinary expertise, to improve teaching and learning in their own courses and those of their colleagues. Maurer (2022) states that unanticipated situations such as the COVID-19 pandemic have demonstrated the value of SoTL-active educators - as 'cosmopolitan assets' - to assist their institutions and further their missions.

Flavell *et al.* (2018) and Webb and Tierney (2022) discuss the role of leadership at both departmental (local) and institutional level in fostering SoTL. Leaders who understand the significance of SoTL and its impact on learning and teaching will set up the support infrastructures for growth and sustenance of SoTL culture.

Verwoord and Poole (2016) found that leadership positions (both appointed and emergent) at the micro, meso and macro levels of the 4M framework are required to support and champion SoTL. For example, leadership at macro level can catalyse an institutional culture that fosters SoTL growth. Williams *et al.* (2013) proposed that for SoTL to take root in organisational cultures, there must be: a) effective communication and dissemination of SoTL activity across all levels; b) social networks and links between the three levels; and c) sustained support by senior administration.

Developing a positive institutional SoTL culture, which is participatory, collaborative, and co-productive, will mobilise collaborative SoTL[48] and pan-university efforts to tackle the emerging challenges of learning and teaching in a dynamic and ever-changing HE environment.

Williams *et al.* (2013, p. 49) argue that

weaving SoTL into institutional cultures requires the coordinated actions of individuals working in linked social networks rather than individuals acting in isolation.

Hutchings *et al.* (2011) caution that development of an institution-wide culture that is conducive to conducting SoTL is a long-term process.

Simmons and Taylor (2019, p. 12) highlight the significance of institutional culture for supporting SoTL and fostering impact:

Institutional culture stands out as an area requiring significant focus if SoTL is to develop beyond a grass-roots genre of scholarly work to reach its full potential as a form of inquiry that can have a strong impact on the learning of both students and teachers.

In our experience at the OU, providing institutional support to SoTL scholars in the form of funding, time (through workload management), and professional development and training (just as eSTEeM does at the OU) fosters a culture of SoTL and facilitates its impact. Increased institutional recognition of SoTL and supporting educators in SoTL projects from inception to dissemination and collecting evidence of impact motivates educators to engage in impactful SoTL.

An educator shared her experiences of being supported by eSTEeM and the broadening of her 'academic identity':

[eSTEeM] enabled me to make the transition from science subject-based research to educational research by providing training and development opportunities and funding.

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48 'Collaboration in SoTL', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109159&section=2

Further, when an institution's strategic plans (such as, teaching and learning plan; scholarship plan; equality, diversity, and inclusion plan) explicitly recognise and value SoTL, it will have implications for whether educators choose to pursue SoTL and for the expectations and subsequent behaviour of students who choose the institution (Mighty, 2013).

It is vital that HE institutions value SoTL on an equal footing as disciplinary research. While disciplinary research helps educators to maintain and grow their field of expertise which informs teaching and the content of materials, a key characteristic of SoTL is that it improves the learning outcomes for students (Simmons *et al.,* 2021).

Based on the experience of conducting impact evaluations in the impact evaluation initiative (detailed in this guide and the compendium of case studies[49]), we believe that as SoTL matures and the scope of SoTL projects grows, impact evaluations will reveal causations between SoTL inquiries, institutional impact and impact in the HE sector at a national level and beyond.

49   Minocha, Shailey and Collins, Trevor (2023). *Impact of Scholarship of Teaching and Learning: A compendium of case studies*. The Open University, Milton Keynes, UK, https://doi.org/10.21954/ou.ro.000155c0

4. Impact evaluation initiative

The aims of the impact evaluation initiative of SoTL projects were to:

- capture the impact of a selected set of SoTL projects using the IEF,

- identify the facilitators and barriers of generating impact in SoTL projects, and

- derive strategies for supporting SoTL and for planning and evaluating the impact of SoTL.

We have applied a case study methodology to analyse and report the impact of 16 SoTL projects: 15 eSTEeM-funded SoTL projects and one supported by the School of Mathematics and Statistics. In this section, we describe the case study methodology and the processes of data collection and analysis that led to the compendium of case studies (Minocha and Collins, 2023).

4.1 Case study methodology

A case study methodology has been employed to generate an in-depth understanding of the impact of each of the SoTL projects or inquiries and to present the impact of these SoTL projects as case studies in the compendium.

A case study is an analysis in detail of a single phenomenon which is studied holistically by one of more methods. Simons (2009, p. 21) defines case study as

…an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, programme or system in a 'real life' context. It is research-based, inclusive of different methods and is evidence-led.

Thomas (2019, p. 2) explains case study as focusing on a single person, incident, or phenomenon to examine a theoretical issue in-depth, offering a holistic analysis which may employ diverse methods of data collection and analysis:

…with the aim of understanding people and events not as phenomena comprising disparate disconnected parts but rather as phenomena with interconnected elements interplaying in a social ecology.

Thomas (2019, p. 22) concludes:

They [case studies] excavate, elaborate, and explicate, offering to researchers a form of inquiry that promises kinds of understanding not accessible through reductionistic research design frames.

Case studies can be particularly useful for understanding how different elements of the phenomenon being studied fit together and how different elements have produced the observed impacts.

The guide 'Case study evaluations' for the World Bank (Morra and Friedlander, 1999) provides guidance and advice on the use of case studies. The guide defines case study (p. 3) as:

A case study is a method for learning about a complex instance, based on a comprehensive understanding of that instance obtained through extensive description and analysis of that instance taken as a whole and in its context.

Case study refers to both the process of investigation (that is, how a case is studied) and the product of that investigation (that is, the write-up or representation of the case) (Tight, 2017).

In the impact evaluation initiative, the case study methodology has enabled each SoTL project to be studied as a 'case' or as the subject of study through the lens of 'impact of SoTL', and whose impact has been analysed and explicated in a 'case study'.

For each of the SoTL projects, the case study presented in the accompanying compendium encapsulates the context of the SoTL project, the rationale and aims of the inquiry, the underpinning research such as the research methods employed, and the key findings. The early background sections are quite brief as our focus has been to report on the impact evaluation of each of the SoTL projects. The description of impact is structured around the IEF (**Appendix 1**) along with reflections from the SoTL project team and the authors.

The resources of the SoTL project listed at the end of the case study comprise of end-of-project report and other dissemination materials such as posters, videos, conference presentations and journal papers. Interested colleagues may like to refer to these materials for a detailed and fuller account of the SoTL project's research. If you would like to know more about any of the case studies, our suggestion would be to seek advice from the primary contact person in each of the case studies.

4.2   Case study template

The case study template that we have used in the compendium is based on UK's Research Excellence Framework (REF) impact case study guidance[50] and our previous work on case studies for Jisc[51].

Each case study narrates the story[52] of the SoTL project with a focus on its impact. It has been written using a structured approach with the following components comprising the template (**Table 4.1**).

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50   REF 2021, Submission system data requirements, https://www.ref.ac.uk/guidance/submission-system-data-requirements/
51   A study of the effective use of social software to support student learning and engagement, Available at: http://oro.open.ac.uk/16141/
52   The Art of Storytelling for Case Studies, https://indeed.design/article/the-art-of-storytelling-for-case-studies

Table 4.1 The case study template

The **Fact box** has the following headings:

Project title: Actual project title (and slightly shortened from the actual project title).

Aim of the SoTL inquiry: Description of the aim of the SoTL project (30–50 words).

Type of SoTL inquiry: This is based on the taxonomy of areas of investigation in SoTL[53].

Led by: Which School in the OU's Faculty of STEM.

Contact: Project lead(s) name(s) and contact email addresses.

Theme: One of seven pedagogical themes (see **Section 5**).

Research methods: Research methods used in the SoTL inquiry.

Duration: Start and end year of the SoTL inquiry.

Keywords: Terms related to the pedagogical underpinnings of the inquiry (such as assessment; technology-enabled learning, and participatory design).

Webpage: Project page (usually on eSTEeM's website, which includes the project description and associated outputs).

Context and aim of the SoTL inquiry	Sets the context of the SoTL project and the motivation for conducting the SoTL inquiry (~250 words).
Underpinning research of the SoTL inquiry	Research design and any challenges that were encountered (~250 words).
Findings of the SoTL inquiry	Key findings of the project (~250 words).
Key lessons and details of the impact	Any recommendations or lessons learned and an impact analysis of the SoTL project by applying the IEF (~500–750 words).
Reflections on SoTL practice	Reflections on the SoTL practice guided by the principles of SoTL[54] (~100–300 words).
Project resources and other references	Project resources including end-of-project reports, videos, papers, presentations, and posters, and literature sources referred to within the case study.

At the end of the section 'Reflections on SoTL practice' in the case study, a quote from the project team/leads is included which captures the ethos of the project or key recommendations or some final reflections on the significance and reach of the impact for that project.

4.3   Data collection for the case studies

Although each of the SoTL projects had several resources (for example, end-of-project report, publications, posters) from which the case study could have been written, the impact narrative was developed in collaboration with the project team/leads. The IEF was applied to guide the impact evaluations and the project team/lead validated each case study.

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53   'Areas of investigation in SoTL', *in* 'Scholarship of Teaching and Learning in STEM' Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109157&section=3.3

54   'Principles of SoTL', *in* 'Scholarship of Teaching and Learning in STEM' Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/ocw/mod/oucontent/view.php?id=109160&section=2

At the start of the impact evaluation initiative, an application outlining the research design and accompanying research materials was submitted to the OU's Human Research Ethics Committee[55] for ethics review to ensure the ethical integrity of the research undertaken for this impact evaluation.

4.3.1 Ethical considerations

The project materials comprised of a consent form and a project summary sheet to inform the participating SoTL project teams about the purposes of the impact evaluation initiative and what would be involved. The materials were approved by Chair's action and the Human Research Ethics Committee (HREC) assigned a reference number (HREC/3375/Minocha). The HREC reference number was included in the documents and communications sent to the participating SoTL project teams to assure them that the initiative adheres to the OU's 'ethics principles for research with human participants'[56] and has received approval from the HREC. The consent form and the project summary sheet are included in **Appendix 2**.

Ahead of data collection, the consent form and the project summary sheet were sent to the participating SoTL projects for their consideration. If there was more than one team member participating in the impact evaluation exercise, each of the members signed the consent form. Once the consent forms were received from individual project teams/leads, the consent forms were signed by the impact evaluator and signed copies of the consent forms were sent back to the project teams.

4.3.2 Self-evaluation of impact of SoTL projects

A question-based self-evaluation form (in Microsoft Word™) consisting of 12 impact criteria was derived from the IEF (see **Appendix 3**) for retrospective impact evaluation. Along with the (generic) IEF-based questions, the impact evaluator included a few project-specific questions to trigger reflections and to enquire about the impact since the end-of-project report and any other dissemination materials that were written up by the project team.

The last two questions in the self-evaluation form pertained to reflecting on:

- Whether the SoTL project led to any unintended impact (different from what the project team had anticipated)?

- How the IEF (that is, the 12 facets and their attributes) may have hindered or supported the impact evaluation of the SoTL activity?

One of the project leads said:

The IEF has been very helpful in focussing my evaluation. The categories [of facets and attributes] cover many aspects and are open enough to include all relevant points.

55   Human Research Ethics Review Process, The Open University, UK, https://www.open.ac.uk/research/governance/ethics/human/review-process
56   Research ethics guidelines, Research at The Open University, https://www.open.ac.uk/research/governance/ethics/human/guidelines

Another project lead said:

I found the 12 criteria very specific and helpful. It would be useful if these were shared across the OU, especially PIs [Principal Investigators] before they start a project as the IEF could help to signpost possible pathways to impact.

Each project team took 10–15 days to reflect on their project's impact and return the completed self-evaluation form to the impact evaluator.

4.3.3 Impact evaluation by the impact evaluator

The impact evaluator conducted an independent impact evaluation of the SoTL project using the IEF and by referring to the project's resources such as the end-of-project report, posters, and any published papers. Once the impact evaluator received the self-evaluation form from the project team, the first draft of the impact narrative of the case study was developed by using the case study template. The impact evaluator consolidated the two sets of evaluations: the self-evaluation by the project team/leads, and the impact evaluation conducted by the impact evaluator.

4.3.4 Review of the case study

Once the impact evaluator had written up the case study, it was sent to the project team/lead for their review and validation. The feedback on the individual case studies was incorporated by the impact evaluator to generate a revised set of case studies. At this stage, the case studies were reviewed by the other author (of this guide and associated compendium). The case studies were further refined in response to the feedback, and the impact evaluator added the final section related to 'Reflections on SoTL practice' (see **Table 4.1**) to each of the case studies. The case studies were sent to the project teams for any final thoughts and for validation.

4.3.5 The process of impact evaluation

The stages of the impact evaluation initiative are captured in the Table below.

Table 4.2 The Impact Evaluation Initiative

Activities for each SoTL project
• Self-evaluation of the impact by the project team/lead(s)
• Impact evaluation by the 'impact evaluator'
• Draft case study developed by the impact evaluator by combining outputs of the first two steps
• Review and validation of the draft case study by the project team/lead(s)
• Revise each case study to incorporate the feedback
Activities for developing the compendium of case studies
• Review of the case studies by the other author
• Further revision of the case studies by the impact evaluator
• Addition of the final section related to 'Reflections on SoTL practice' to each of the case studies by the impact evaluator
• Review and validation of each of the case studies by the respective project team/lead(s)

In the next section, we discuss the limitations of the impact evaluation initiative and its methodology.

4.4 Limitations of the impact evaluation initiative

There are some limitations of the impact evaluation initiative that we have applied to develop the impact case studies.

Case studies are 'snapshots'

The investigations have been conducted on the 'current' situation and the data that we have elicited is not through longitudinal studies[57]. As a result, even though we have drawn out generalisations, the case studies should be considered 'snapshots' which are reporting the situation when the data for the impact evaluation initiative was collected.

Case study content

Although an attempt has been made to give sufficient detail about each case study to enable the reader to understand the context, rationale, and underpinning research of each project, the focus for the purposes of this initiative has been on detailing the impact of the project. Hence, the case study description of an individual project may not have captured the richness of the research process of the SoTL inquiry, such as the justification of the research methods that were employed for data collection and analysis, and the associated challenges of conducting the research. We suggest that the readers refer to the project resources listed in each case study to find out more about the research design and process of an individual SoTL project.

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57   Longitudinal study, https://en.wikipedia.org/wiki/Longitudinal_study

Ethical considerations in individual SoTL projects

Each of the SoTL projects featured in the compendium (Minocha and Collins, 2023) has been through a rigorous ethical approval process and has been conducted as per the ethical considerations advised at the OU. The case study content hasn't captured the ethical approval process and the materials that were submitted for ethical approval. The details of the ethical considerations and the data protection measures are in the project reports and publications of individual SoTL projects. The resources of each project are listed at the end of each of the case studies.

Impact Evaluation Framework

As we have seen in **Section 3**, there are several frameworks available to evaluate and evidence impact of SoTL. The ethos of impact evaluation is to establish whether there is a causal relationship between the research conducted and impact and provide the corresponding evidence. The IEF that we have derived and used is just one such process for evaluating impact. Colleagues in the community are encouraged to adapt the IEF[58] or use any other impact evaluation frameworks or models discussed in **Section 3** to suit their context and the objectives of their impact evaluation.

Sustainability of the impact of SoTL initiatives

In the compendium and associated analyses, we haven't discussed in detail the sustainability of the impact (was the impact maintained?) of the individual 16 projects. Most of the initiatives discussed in the compendium continue to run at the OU and are generating impact and inspiring other SoTL projects and educators.

It is, however, important to investigate the factors that contribute to the sustainability of impact of SoTL initiatives and to understand how this long-term impact can be monitored and evaluated. For example, if there is a new policy based on a SoTL inquiry's findings, then it is the evidence of impact of that SoTL inquiry. However, to track the sustainability of the impact and the long-term impact, it would be useful to monitor the outcomes of this policy, and whether the policy itself stood the test of time.

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58   The impact evaluation framework for SoTL has been shared under Creative Commons licence: Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0), https://creativecommons.org/licenses/by-nc-sa/4.0/

4.5   Outcomes of the impact evaluation initiative

One of the key outputs of the impact evaluation initiative is the set of 16 case studies of SoTL projects, presented in the accompanying document: '*Impact evaluation of Scholarship of Teaching and Learning: A compendium of case studies*' (Minocha and Collins, 2023). The case studies and reflections on SoTL practice, guided by the IEF, in each of these SoTL projects demonstrate the role of SoTL and its impact on educator's academic practice, professional development and career progression, on student learning, and on other facets of impact included in the IEF in **Appendix 1**.

In addition, the initiative has yielded the following outcomes, which are discussed in this guide:

- the identification of key enablers and strategies for the generation of impact;

- an understanding of eSTEeM's role in supporting SoTL in STEM at the OU;

- a toolkit for planning, generating, monitoring, and communicating impact from SoTL; and

- a list of challenges to generating impact of SoTL.

We hope that the outcomes of the impact evaluation initiative will inform learning and teaching strategies, SoTL practice, and impact evaluation of SoTL in HE. We discuss the implications of this impact evaluation initiative in **Section 6.3**.

5. Compendium of case studies

The compendium of case studies of 16 SoTL projects (Minocha and Collins, 2023) captures the impact of SoTL research on various attributes of learning and teaching such as academic practice, student learning and engagement, and the personal and professional development of the SoTL project teams.

The case studies pertain to the following seven pedagogical themes:

1. *Ensuring accessibility of learning and teaching resources:* SoTL projects focus on designing and evaluating learning materials and environments such that students who rely on assistive technologies to interact with documents and presentations are not disadvantaged. Ensuring accessibility sometimes involves generating effective alternative formats of the learning and teaching resources.

2. *Designing assessment:* SoTL inquiries are concerned with the way the assessment is planned, designed, and conducted.

3. *Building digital skills:* SoTL projects that focus on building digital skills[59] of students.

4. *Supporting the student journey:* A student's journey with an institution or even with a module is composed of stages from student's enquiry, registration, progress during a module and onto the next stage of study and so on, and until the end of the chosen programme of study by the student.

5. *Providing authentic experimental and practical learning:* SoTL projects focus on designing and evaluating authentic learning experiences in physical and virtual learning environments.

6. *Influencing concepts, practices and ways of thinking in a discipline:* Often SoTL research results in outcomes that influence how certain concepts, practices and ways of thinking are taught in a discipline.

7. *Involving students as partners:* Involving students as partners in learning and teaching is a pedagogical approach in which students and educators work collaboratively and in partnership to improve teaching and learning experiences. Students are often involved as partners in SoTL[60]:

5.1 Pedagogical themes, case studies, keywords and codes

In **Table 5.1**, the case studies are listed corresponding to each of the seven pedagogical themes.

The keywords against each of the case studies highlight the key aspects related to learning and teaching to which that case study or SoTL project pertains to. Each case study has been assigned a code. The case studies are referred to by their codes in discussion in this guide and in the compendium.

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59   Jisc's digital capabilities framework has six elements of digital skills or 'capabilities' for students. https://digitalcapability.jisc.ac.uk/what-is-digital-capability/individual-digital-capabilities/

60   'Students as partners in SoTL', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109324&section=1

Table 5.1 Pedagogical themes, case studies, keywords and codes

Theme	Case study title	Aim of the SoTL project	Keywords	Code
Ensuring accessibility of learning and teaching resources	Remote sighted helper support for visually impaired students	Remote sighted helper support for visually impaired students: exploring good practice The aim of this project was to investigate how visually impaired students may be supported by a remote sighted helper to interact with a visual programming environment.	accessibility; remote support; sighted helper; visual impairment; visual programming	**[AC]**
Designing assessment	Voluntary diagnostic quizzes in mathematics modules[61]	'Are you ready?' Quiz in mathematics modules The aim of this SoTL inquiry was to investigate the relationship between completing a diagnostic quiz and student success and how the uptake of the diagnostic quiz by students who were aiming to register on Level 1 Mathematics modules could be improved.	diagnostic quiz; learning analytics; predictive analytics; predictive learning analytics; student readiness; student retention	**[A1]**
	Interactive online quizzes in formative assessment	Assessment analytics of student engagement with, and performance on, S217 online quizzes The aim of the SoTL inquiry was to understand how students on a Level 2 Physics module (S217) use online quizzes and to what extent the quizzes help students prepare for their formative assessment (i.e., the tutor-marked assignments).	assessment; formative assessment; online quiz; self-assessment	**[A2]**

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61   Other than the SoTL project 'Voluntary diagnostic quizzes in mathematics modules,' which was supported by the School of Mathematics and Statistics, all the other SoTL projects in the compendium were funded and supported by eSTEeM, the OU Centre for STEM pedagogy.

Theme	Case study title	Aim of the SoTL project	Keywords	Code
Building digital skills	Online journal clubs	Online journal clubs in distance higher education: an opportunity to develop skills and community? The aim of this SoTL inquiry was to investigate the role of student online journal clubs in developing digital skills of students, building their online confidence, and in fostering an online academic community.	digital skills; employability; online learning communities; skills development; student support	**[DS]**
Supporting the student journey	The Mathematics and Statistics subject site	The Mathematics and Statistics subject site The aim of this SoTL inquiry was to evaluate the effectiveness of the Mathematics and Statistics study site for students, tutors, and student support staff.	employability; online learning communities; participatory design; student support	**[J1]**
	Qualification subject websites in STEM	Qualification subject websites: uptake and practice The aim of this SoTL inquiry was to investigate how the undergraduate subject websites in STEM were being used and how they were being perceived by students.	employability; online learning communities; student support	**[J2]**
	A flexible start to a module	A flexible start to the 'Introducing Statistics' module The aim of this SoTL inquiry was to investigate whether the early start to a Level 1 module of Statistics will contribute towards student retention and student progression.	student progression; student retention; student success; supporting students	**[J3]**
	Cross-level engagement between staff and students	Developing a sense of community through cross-level engagement between staff and students in creative industries subjects The aim of the project was to pilot and evaluate innovative programme-level blended engagement events with the goal of creating a community of learners across a qualification.	community building; Community of Inquiry (CoI); design education; students as partners	**[J4]**
	On-screen learning	An investigation into how STEM students use learning resources in different formats, and how this use develops over time The aim of the project was to investigate how distance learning STEM students use on-screen and paper-based learning resources on a range of Level 2 (second year undergraduate) modules.	learning resources; on-screen learning; printed resources; student support	**[J5]**
	Predictions of at-risk students	Predictions of at-risk students The aim of this project was to investigate the possible errors made by Machine Learning models in predicting students as risk of not submitting their assignments.	at-risk students; predictive learning analytics; student retention; student support	**[J6]**

Theme	Case study title	Aim of the SoTL project	Keywords	Code
Providing authentic experimental and practical learning	Interactive virtual visits	Are virtual visits an effective way of engaging learners? The aim of this project was to investigate if a live interactive virtual visit to Bletchley Park Museum using technologies such as onscreen polls, multiple choice questions and a chat box was an effective way of enhancing student experience.	employability; student support; virtual visits; widening participation	**[P1]**
	A 3D virtual field trip	A 3D virtual field trip The aim of this SoTL inquiry was to investigate the pedagogical advantages of 3D (three-dimensional) virtual field trips and the challenges for their adoption.	3D simulation; physical fieldwork; physical fieldtrips; virtual fieldtrips; virtual fieldwork	**[P2]**
	Geology photo blog	Geology photo blog The aim of this SoTL inquiry was to re-develop the pilot Geology Photo Blog, initially for use in a predecessor module, 'Geology', and re-launch it as an integral part of the 'Earth Science' module.	geosciences education; peer-to-peer support; photo blog; spatial learning; spatial literacy	**[P3]**
Influencing concepts, practices, and ways of thinking in a discipline	Interactions in OpenStudio across a qualification	Are we making progress? Progression through learners' interaction in OpenStudio across a qualification The aim of the project was to investigate how students progress in OpenStudio as they move through the Design and Innovation qualification.	design education; social learning; virtual design studio	**[D1]**
	Remote pair programming	Investigating the perceived benefits to computing students of remote pair programming The aim of the project was to investigate the benefits for distance learning Computing students by engaging in 'remote pair programming' in their learning.	employability; pair programming; remote collaboration; remote pair programming	**[D2]**

Theme	Case study title	Aim of the SoTL project	Keywords	Code
Involving students as partners	Students as partners in Scholarship of Teaching and Learning	eSTEeM: Students as partners The aim of this ongoing project is to develop structures, guidance, and support for student engagement in eSTEeM projects and to monitor and evaluate the role of students as partners in SoTL.	co-designers; co-researchers; participatory design; students as partners	**[SP]**

6. Findings: impact evaluation initiative

The analysis of individual SoTL case studies has led to the examination of factors that enable the generation of impact of SoTL which we now discuss.

6.1 Enabling factors for generating impact

From the analysis of the case studies, we have derived the following enablers for generating impact of SoTL. Each of the enabling factors is given a title and explanation along with examples from individual case studies in the compendium (Minocha and Collins, 2023). In the discussion, the case studies are referred to by their **codes** which are listed in **Table 5.1** against each of the case studies.

Motivation to engage in SoTL

For educators on education-focused contracts and early career educators, engaging with SoTL and the subsequent impact may help towards promotions, rewards, and career advancement. Other extrinsic motivating factors could be to demonstrate a funding success or to create a portfolio for applying for fellowships such as from Advance HE (or HEA)[62]. The intrinsic motivating factors could be to make a difference, improve learning and teaching, conduct research, satisfy curiosity, or work with others.

In the SoTL projects that we analysed, we found both extrinsic and intrinsic motivating factors. Educators were keen to find solutions to the problem they were experiencing or observing, and some wanted to build a portfolio of impactful SoTL for career progression.

The motivation of the researcher influences the vision for impact and the time-period over which the impact will be monitored, and the evidence will be recorded.

Support by eSTEeM

In our analyses of the case studies and in our conversations with the project teams/leads, we found that eSTEeM has helped towards advancing SoTL by:

- broadening the recognition of SoTL within the STEM faculty and highlighting the value of SoTL within the OU and externally

- supporting professional development of educators within the OU

- providing strategic and systematic support for conducting and disseminating SoTL inquiries

- providing project management support which has been essential for keeping projects on track

- advancing the careers of SoTL researchers by enabling the development of a SoTL portfolio for awards, promotions, and accreditation (for example, Advance HE fellowships).

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62 Advance HE (HEA) Fellowships, https://www.advance-he.ac.uk/fellowship

A project lead in the Faculty of STEM reflected on her experiences:

Being an eSTEeM project leader has given me huge confidence in my abilities as an academic. It has brought me into closer working relationships with my Associate Lecturers, academics, and beyond. My work with eSTEeM will also feature prominently in my promotion case to Senior Lecturer, a promotion route that I had abandoned hope of achieving long ago. Now thanks to eSTEeM, I have the confidence to go for Senior Lecturer and really solidify my identity as an academic with world-leading expertise in distance teaching and learning.

Support at School level

Before educators submit SoTL project proposals to eSTEeM for funding, the School Scholarship Leads and Director of Teaching review the draft project proposal. They assess whether and how the project addresses strategic priorities of the school, or the faculty or the OU for possible impact. The project's research design is also scrutinised, and if the proposal is deemed to be acceptable for submission, the Head of School considers/approves the time allocation of staff for SoTL activity. This support by the school of balancing workloads and providing feedback on the feasibility, rigour, ethical considerations and possible impact of the proposed SoTL inquiry strengthen the project.

Adhering to the principles of SoTL

There are six principles of SoTL[63] that can serve as heuristics to guide the design, development and evaluation of a SoTL inquiry for impact:

1. inquiry focused on student learning and engagement

2. grounded in one or more of these contexts (for example, a particular classroom, cohort of students, module, discipline, department, or institution)

3. rigorous and methodologically sound research design

4. conducted in partnership with students

5. appropriately public for evaluation and uptake by peers

6. reflection, critical reflection and reflexivity being integral to the SoTL practice and inquiry.

In the SoTL projects that we evaluated, we found that the first five principles were integral to all the projects. The sixth principle wasn't explicit as compared to the other five in our investigations – yet it is vital for the efficacy of SoTL. The continuum of *reflection, critical reflection* and *reflexivity*[64] supports the SoTL project and possible impact – including examining unintended impacts.

Reflection on one's own practice by the educator most often initiates a SoTL intervention or project: for example, 'what's really the problem here and what do I need to do?'; why do I choose to attend to this problem?'

63 'Principles of SoTL', *in* 'Scholarship of Teaching and Learning in STEM' Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/ocw/mod/oucontent/view.php?id=109160&section=2

64 'Reflection, critical reflection and reflexivity', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109160&section=3

Prosser (2008, p. 1) defines SoTL as:

> *evidence based critical reflection on practice aimed at improving practice*

to reinforce the critical reflection aspect of SoTL. *Critical reflection* by individual project team members and with stakeholders and via peer review through dissemination supports generation of impact. Kreber (2006) argues that it is through reflection that existing assumptions, conceptions and practices are questioned and validated.

Reflexivity, in contrast to reflection, involves a more immediate, dynamic and continuing self-awareness: being self-reflexive about one's own beliefs, values, assumptions and ways of interacting (Cunliffe, 2016), and being critically reflexive about underpinning institutional practices, policies and social structures, and the intended and unintended moral and ethical consequences (Cunliffe, 2020).

Critical reflection and both self-reflexivity and critical reflexivity are important in SoTL practice to assess and evaluate the impact of teaching and other academic practices within an institution on student learning. In terms of conducting research, it is vital to be reflexive so that the researcher(s) can explicitly acknowledge and interrogate the likely impact of the project team's experiences and preferences on all aspects of the research process (Musgrave, 2019).

Building on a previous SoTL project

It can be often useful in SoTL practice to build on and extend previous SoTL projects to arrive at outcomes that provide further evidence for the focal area of investigation, or to highlight the limitations of the previous SoTL investigation. Such follow-on investigations strengthen the SoTL knowledge base for improving academic practice.

For example, Georgy in the School of Design and Innovation built her SoTL project [J2] as an extension to the project [J1] previously conducted in the School of Mathematics and Statistics. The data from Georgy's project strengthened and reinforced the evidence of the previous project [J1]. In fact, Georgy and Rachel (project lead of [J1]) joined forces and participated in university-level meetings to present the evidence of their projects.

In the case study [J2], Georgy has reflected on the significance of collaborative SoTL, commenting on how SoTL project leads from different disciplines but with a common goal can come together to make a stronger case for change than they would have done individually.

The project leads of [DS] set up a follow-on project to adapt the online journal club (OJC) model to a face-to-face setting for students in secure environments. The experience and success on this follow-on project led to an invitation to develop a report for the Centre for Social Justice (a policy think tank) concerning prison rehabilitation in terms of education and employment.

Similarly, Martin and his project team set up an extension of their [J6] project to focus on a specific strategic priority of awarding gaps at the OU. The end-of-project reports of both [J6] and the follow-on project are used in staff development at the OU.

The likelihood of impact generation and the significance and reach of the impact are enhanced when there is a strategic development of knowledge base and evidence of impact around an innovation or intervention through more than one investigation.

Conducting pilots of the intervention

For conceptualisation and design of impactful SoTL interventions, it can be useful to run pilots. In [J3], Carol applied for funding from eSTEeM after she had conducted a few (unfunded) attempts of exploration to understand the problem and the possible 'solution'. Sometimes it may be helpful to run a few pilots and/or have conversations with peers and stakeholders to determine the value of conducting a full-scale SoTL intervention and if the anticipated change will indeed happen.

In [P3], the implementation of Geology photo blog (GPB) in 2014 in the module *Earth Science* (S209)[65] module (where the GPB continues to be embedded) came about after a series of initiatives from 2011 onwards including a pilot and its evaluations in another module *Geology* (S276)[66]. The development of the GPB, therefore, occurred in various bursts and through a process of iterative design, development and evaluation with tutors, students, and module team members from 2011 and until 2014. This example of GPB shows that an innovation may go through a pilot and several cycles of SoTL practice and projects before its integration in the curriculum for possible impact.

Pilots, early evaluations, participatory design approaches with stakeholders and early dissemination are some of the strategies that enable SoTL innovations to generate learning and teaching enhancement.

Involving students as partners

Involving students as partners in SoTL is a pedagogical approach in which students and educators work in collaboration to improve teaching and learning experiences. In the OU's BOC on SoTL, we have presented a continuum of involving students in SoTL[67] - from pilot participants in a project to being independent SoTL researchers.

Students as partners in SoTL is a recurring theme in many of the case studies. For example, in case studies [AC], [A2], [D1] and [D2], the project teams involved students as research participants.

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65   S209 Earth Science, https://www.open.ac.uk/courses/modules/s209
66   S276 Geology, https://www.open.ac.uk/library/digital-archive/module/xcri:S276/study
67   'Involving students as partners in SoTL', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109324&section=1.1

On the other end of the continuum of student involvement, in the case study [SP], Trevor has collaboratively developed the 'Students as partners in scholarship framework'[68] with students. In fact, a student co-led the 'students as partners in scholarship' initiative when it was first launched in 2019. The framework provides a collection of activities, procedures, and guidance for engaging students in SoTL at the OU. In the case study [SP], we have discussed examples of SoTL projects at the OU which have involved students as co-researchers, co-investigators, and even as co-designers of assessment in response to the outputs of a SoTL inquiry.

In all these examples of student involvement in SoTL, students have co-created SoTL's impact at the OU. Integrating student input in SoTL helps to clarify student experiences and brings in a student perspective to the inquiry. For an educator, a partnership with students helps to bring multiple perspectives to bear on an inquiry into teaching and learning practices. Collective challenging of assumptions and deeper questioning with students leads to new ways of thinking and understanding[69]. Therefore, student-educator partnership in SoTL enhances the possibility of generating impact.

Conducting collaborative SoTL

Collaborative SoTL involves collaborating with other educators and students on SoTL projects. Collaborative SoTL[70] brings in multidisciplinary expertise to the problem being investigated, enables the filling of any skills gaps within the team, and enables exploration of questions that are broader and deeper than what is possible by an individual. Hence, the effectiveness of an inquiry and the opportunities for impact are enhanced in collaborative SoTL.

The case study [J4] is an example of collaborative SoTL where tutors, academic staff and students came together and worked as partners in organising and running cross-level engagement events. Student involvement as participants in events and a Facebook group, and as co-designers of an exhibition enhanced their understanding of the Design discipline, increased awareness of their own skills and abilities and their study journey through the Design qualification, and they gained employability skills. Moreover, some students became advocates of the qualification to other students and the public. Further, this collaborative SoTL inquiry has facilitated better relationships and understanding between central and regional staff (including Associate Lecturers/tutors) and students at all levels.

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68 Students as partners in Scholarship Framework, https://www.open.ac.uk/scholarship-and-innovation/esteem/resources/students-partners-scholarship-framework
69 'Advantages of educator-student partnerships' *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109324&section=1.2
70 'Collaboration in SoTL', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109159&section=2

Similarly, in case study [P1], a collaboration across two units of the university enriched the project in terms of content and provided access to different communities and dissemination venues. The project leads, David (in Careers and Employability Services) and Chris (Computing educator), disseminated in both STEM and employability-focused events. As a result, they perceived their project as benefiting pedagogical (computing education, collaborative learning) and employability perspectives. The dissemination and dialogues in different communities have enabled the project team to have an impact in terms of adoption and uptake of their initiative of virtual visits in other disciplines.

The case study [P1] is an excellent exemplar of collaborative SoTL that shows how skills and insights from different parts of an institution can strengthen SoTL activity and lead to contributions that extend beyond the SoTL project.

In [P2], the design and development of the virtual reality (VR) app for virtual fieldtrips in Geology involved collaboration between a geologist (Tom) and a Computer Science educator (Shailey). The subject expertise that Tom brought to the project combined with Shailey's prior experience with VR, and expertise in user-centred design resulted in the development of an VR app that was both pedagogically effective and usable.

In [J1], the SoTL project team undertook a participatory design approach for the design of the student-facing subject website and involving all the stakeholders who are in direct interaction with students at various touchpoints, including tutors, students support teams, student recruitment teams and careers staff. A collaborative SoTL inquiry ensured that the needs of different stakeholders were met in the design, implementation, and evaluation of the website. As a result, the content of the site not only helps students but provides useful information for the student support staff. Rachel, the project lead of [J1], has commented that one of the main successes of her project is that the site is being constantly used by the student support teams for their own information (to guide students) and to point students towards the resources.

Planning for impact from the beginning

SoTL researchers should make a discipline of planning for impact from the beginning. Early planning helps to build secure pathway(s) to impact in addition to pre-empting any barriers to impact. The possible impact of a SoTL inquiry should, therefore, be intrinsic to its design. This will ensure that planning for impact evaluation begins early, allowing for the collection of baseline data or the use of other strategies to investigate the problem and to determine the possible changes that may happen due to the intervention in the SoTL inquiry (for example, who would benefit and how).

For example, in [J3], Carol conducted an analysis of previous presentations of the module to understand when and why students de-register, which identified the need to provide an early start. Carol designed the SoTL project accordingly and the intervention of early or flexible start has led to increased student retention on her module, and she has inspired other modules across the university to provide opportunities for early starts to students.

Employing a variety of research methods to collect evidence of impact

There is no distinct SoTL methodology or method that is consistently advocated in the SoTL literature (Hubball and Clark, 2010). The methodological opportunities for SoTL research are vast and diverse depending upon the context. In fact, there aren't inherently right or wrong answers when it comes to making methodological choices in SoTL research. The key criterion is that the research methods should align with the project's aim and research question(s) (Mueller, 2018).

In [A2], the combination of research methods, learning analytics and interviews, complemented one another. The analytics helped to guide the student-interviews and the data from student-interviews helped to explain and validate the analytics. The mixed methods research approach of combining quantitative and qualitative research approaches enhanced the understanding and corroboration of student behaviour (also, seen in case study [J6]).

The learning analytics-SoTL partnership is growing. It enables evidence-based analysis of learning and teaching trends to identify areas for interventions and innovations to improve student learning (Hubball *et al.,* 2013; Muljana and Placencia, 2018). Learning analytics can help guide the design of a SoTL inquiry and facilitate evaluation of a SoTL inquiry. In Session 2, Section 5 of the OU's BOC on SoTL[71], we discuss the use of learning analytics in SoTL and the ethical considerations. Skene (2022) examines the ethical use of learning analytics and related data mining techniques in the practice of SoTL.

There are several resources in the SoTL literature that may help guide the choice of research methods to be employed in a SoTL inquiry and for collection of evidence of a SoTL project during and after the project. These resources include: the Session 5, Section 2 on research methods[72] in the OU's BOC on SoTL; Nelson (2003); resource by Nancy Chick[73] and shared by Peter Felten on Twitter[74]; Gurung (2021); McKinney (2007); a resource on SoTL inquiry methods[75] at Elon University; quick guide on methodologies in SoTL[76]; a set of materials related to 'Measuring outcomes in SoTL'[77] at the James Madison University; and a practitioner's guide to collecting evidence of learner benefit[78].

Despite employing methods that are aligned to the research questions, a SoTL researcher may have to adapt the research methodology and be transparent and open about what happened and what has been achieved. Factors such as the availability of students for conducting empirical research, time-constraints

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71 'Learning analytics', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109159&section=5

72 'Research design', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109325&section=2

73 Teaching Matters: Capturing Moments of Hope in Your Work as Teacher-Scholar, https://docs.google.com/document/u/1/d/1wnqlBaedMOHBt101X_zFMC_DVJnF0hv9YUSVyuPjw74/mobilebasic or https://tinyurl.com/mthrb9uc

74 Tweet by Peter Felten, https://twitter.com/pfeltenNC/status/1621558017836695554?s=20&t=MbxjTCEcB2T97qfXFLEqZw or https://tinyurl.com/3hx896s2

75 SoTL inquiry methods, https://www.centerforengagedlearning.org/studying-engaged-learning/sotl-inquiry-methods/

76 Methodologies in SoTL, the SoTL WATT WORKS quick guide, Available at: https://lta.hw.ac.uk/wp-content/uploads/26_Methodologies_in_SoTL.pdf

77 Measuring outcomes in SoTL, https://www.jmu.edu/cfi/scholarship/sotl-ets/sotl-what-can-be-measured.shtml

78 A Tertiary Practitioner's Guide to Collecting Evidence of Learner Benefit, https://ako.ac.nz/knowledge-centre/collecting-evidence-of-learner-benefit/

and the skills of the SoTL team can affect the path of empirical research that a SoTL inquiry takes and may not be as intended at the time of designing the inquiry. In the case study [J5], the curriculum changed while the SoTL inquiry was being conducted which necessitated running the questionnaire again.

Sharing emerging findings

Sharing emerging findings with relevant stakeholders during a research project rather than waiting until a final report or journal paper is ready enhances the likelihood of a SoTL project to have an impact. For example, turning the literature review into a briefing note could be a quick win for the stakeholders to get an early insight in the project, the project's significance with respect to the literature and to understand the direction of research in the SoTL project.

Every case study showcased in the compendium has shared emergent findings with the community, such as a presentation in a school meeting, or running a workshop at eSTEeM's annual conference to receive early feedback on the SoTL inquiry. There is a greater possibility of impact of a SoTL project if the team makes the results public as soon as it is possible to share.

Early dissemination in the 'remote programming' project [D2] through a poster and informal networking events led the project team to link up with a team of colleagues in the same School. This team including a postgraduate student was investigating tools for pair programming. In addition to regular knowledge-sharing, the two teams collaborated on a conference publication.

In the induction event to launch new projects after a round of funding, eSTEeM invites the project teams to present a poster of their project. Sharing the project's aims and plan with peers at the start of the project prepares the project team to become open to critique and to reflect on how others can benefit from their research.

Keeping a record of the reflections throughout the SoTL project

Keeping a record of reflections such as in a shared project space (for example, on Microsoft's OneDrive or in a wiki or in a Facebook group) and re-visiting the reflections from time to time in project team meetings or with mentors may help identify the challenges and opportunities for generating impact.

Reflecting in a public space such as writing a blogpost and finding a 'blog voice' can be difficult[79] but with practice, blogging can be rewarding for fostering reflective practice and for sharing research with a wider audience. In large project teams, educators can decide to have a shared blog so that they can share the load of keeping the blog up to date.

79 Roadblocks, opportunities, and a call for blog contributors across three topics, https://illinoisstateuniversitysotl.wordpress.com/2019/12/03/roadblocks-opportunities-and-a-call-for-blog-contributors-across-three-topics/

In [J4], the project team created social media resources to connect with students and tutors about events during the SoTL inquiry: YouTube[80]; Facebook group[81], Design@Open blog[82]. These resources now play a vital role in showcasing the work of OU's Design group and informing prospective Design students of what studying Design at a distance might involve.

Disseminating SoTL project's results

Dissemination via videos (for example, in case study [DS], [J3], [J4] and [P1]), blogposts (as in [J1] and [J4]), and through presentations in internal events (which all the case studies have done) before formal publication in a conference/journal has helped raise the profile of the projects. The projects have generated discussion and feedback, and mobilised uptake.

eSTEeM's annual conference is a useful platform for early dissemination - to showcase SoTL projects to an internal audience and receive peer feedback. Depending upon the stage of the SoTL project, the conference provides various categories to choose from to present the project, such as posters, workshops, demonstrations, and short oral presentations.

In the project [P3], the technological innovation of a Geology photo blog was inspired by an innovation that the project co-lead (Sarah) had set up in another module. Sarah presented the innovation and its rationale within her School and OU's e-learning community which inspired Tom (project co-lead of [P3]) to set up the pilot study for the Geology photo blog.

Sharing SoTL practice with peers is one of the key principles of SoTL. Both internal and external dissemination enable peer review, evaluation by the community and establish a continuous monitoring process for impact of SoTL[83]. In all the case studies in the compendium, dissemination has been central to the each of the project's activities – some leading to journal papers and thereby contributing to the SoTL knowledge base and subsequently leading to citations (Chick *et al.*, 2021).

Publication in peer reviewed journals and conferences, like in the case studies in the compendium, will help raise the profile of the SoTL project in the external community and create opportunities for uptake of the project's outcomes. Engaging with the community helps demonstrate how a SoTL inquiry can be conducted to colleagues who are new to SoTL.

Disseminating SoTL project's artefacts

The case study on online journal clubs (OJCs) [DS] created 'starter resources' for setting up an OJC and shared them with the community on their project webpage on eSTEeM's website. Several module teams in the OU have set up OJCs and are evaluating the effectiveness of OJCs in their contexts. The 'Students as partners in Scholarship framework' (in case study [SP]), originally developed in the Faculty of STEM and for SoTL in STEM, is now being used across the OU.

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80   Design at Open, https://www.youtube.com/channel/UC5dwgQTcTO0bCgA1Oiu-TBQ
81   design@open, https://www.facebook.com/groups/1599710346973999
82   Design@Open blog, http://www.open.ac.uk/blogs/design/
83   'The impact of SoTL', *in* 'Scholarship of Learning and Teaching in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109326&section=2

Sharing resources and artefacts from the SoTL projects can facilitate the uptake of a SoTL project's findings.

Based on the results of the [D1] project involving virtual design studio, the project team of [D1] along with other members of the OU Design Group[84] set up the Distance Design Education blog[85] and the Creating Distance Design Courses guide[86]. During the COVID-19 pandemic, the 'Creating Distance Design Courses' blog was particularly useful to share the expertise of OU design educators with colleagues in other institutions who had lost access to traditional studio spaces for Design education.

There are various Creative Commons licences[87] under which research artefacts can be shared with the community to enable others to adapt and apply the artefacts in their context. Research design materials such as questionnaires, interview protocols, rubrics of assessment and so on, can be useful exemplars for educators who are new to SoTL.

As described in [P2], the design and evaluation of the Virtual Skiddaw App, a virtual reality-based (VR) geology fieldtrip, led to long-lasting external collaborations and funding from a range of organisations including the industry (Google). The project leads (Tom and Shailey) are regularly contacted by colleagues within the OU and externally to share their VR expertise. However, in [P2], the project leads lament that they didn't make the app easily accessible to the community from the start, and this prevented the uptake of the app.

For uptake of the outcomes of an innovation, it is important to make the project's results and artefacts (including technological innovations) easily and openly accessible as much as it is possible.

Making research accessible to stakeholders

SoTL researchers should be proactive in removing barriers that prevent stakeholders from accessing research. Researchers should consider utilising open access publishing, using social media for dissemination such as maintaining a project blog, choosing event locations that are convenient for the target audience, or hosting virtual events.

In the project [A1], Carol and her colleagues shared the results of their inquiry in an institution-wide quality enhancement report for the internal OU audience, and in an open access journal for educators in other institutions. As a result of Carol and her team's efforts of sharing what they learned, diagnostic self-assessment quizzes have become prevalent in several courses across the Faculty of STEM[88] giving an opportunity for students to check their readiness for a module or study pathway before registration.

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84 Design@Open, https://www.open.ac.uk/blogs/design/design-group/
85 Distance Design Education, https://distancedesigneducation.wordpress.com
86 Creating Distance Design Courses, https://distancedesigneducation.wordpress.com/creating-distance-design-courses/
87 Creative Commons: About the licenses, https://creativecommons.org/licenses/
88 Preparing for Study, Faculty of STEM, The Open University, http://stem.open.ac.uk/Preparing-for-Study and Are you ready for Level 2/3 science modules, http://stem.open.ac.uk/are-you-ready-level-23-modules

Similarly, in [J1], the outcomes of the SoTL inquiry were disseminated in an internal quality enhancement report for colleagues in the OU, and in an open access journal for wider dissemination in the external community. Rachel's work in [J1] became pertinent for other HE institutions during the COVID-19 pandemic when educators were moving to online teaching and learning, and Rachel was invited to write blogposts to share her experiences with the community.

Cook-Sather *et al.* (2019) suggest that colleagues who engage in SoTL occupy a range of roles (such as academic staff, professional staff, student). It is, therefore, important to develop forms of writing that are accessible to a wide range of readers, including students.

Sharing the outcomes of SoTL facilitate peer review (Trigwell, 2013) and can encourage other educators to make use of the outcomes through adoption and adaptation, and help towards fostering SoTL culture.

Being a core part of the team to effect change

To bring about change in response to a SoTL inquiry for possible impact, it can be beneficial if the SoTL practitioner is an integral part of the team which takes decisions about the changes to be made in learning and teaching based on the evidence from the SoTL inquiry. In the project [AC], Richard and colleagues were core members of the module team and were able to bring about the change that subsequently led to impact. Further, Richard's continuing involvement with the module team has helped to sustain the initiative.

In [A2], the SoTL inquiry didn't yield the impact, as intended. However, the project lead developed a deep understanding of students' requirements and behaviour towards quizzes, and how the quizzes should be designed and scheduled in the study calendar of the module. This enhanced knowledge base contributed towards the design and implementation of the assessment strategy of another module *Astronomy* (S284)[89] a few years later, which has led to student retention and student success on S284. The project lead of [A2], Andrew Norton, was a core member of the production team of S284 and was able to apply the results of [A2].

Being in a position of power or leadership to effect change

For realising changes or improvements based on the outputs of a SoTL inquiry, sometimes having an influence of the SoTL practitioner through position or a particular role helps to implement the change for generation of possible impact. For example, in the case study [J5], Laura reflects on her membership of an important decision-making group (Board of Studies) that enabled her to argue providing printed (physical) books to students alongside online learning resources. In the meetings of this group, she presented the evidence from her SoTL project, and she was able to justify the additional expense that the faculty would incur in sending printed books to students.

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89   S284 Astronomy, https://www.open.ac.uk/courses/modules/s284

Funding for sustainability of the intervention

In [J3], Carol discusses how embedding change is not always easy, even when the evidence of impact exists. For example, funding constraints can hamper sustainability of the initiative and long-term change, and the original intervention may have to be adapted to sustain the initiative. In [J3], with the increasing demand from students for the 'early start initiative' but with reduced funding to support the initiative (than before), the module team has adapted the model of tutor support to the students. This modified model is not the same as the one that Carol had in her initiative [J3] and which she had recommended - but this adaptation has the same ethos of support to students who make an early start.

It may not always be possible to sustain the intervention for continued impact if there is a constraint on funding or staff, or a change in management and personnel who may have different priorities.

An ongoing long-term SoTL inquiry

The project [D1] on the use of virtual design studio (OpenStudio) in distance design education has been running since 2014. This ongoing SoTL inquiry has continuously fed into the learning and curriculum designs for distance Design Education and in the usability and pedagogical designs of OpenStudio.

The OpenStudio platform is now in use in several disciplines across the university. The thorough and comprehensive knowledge base on the pedagogical effectiveness of virtual design studios built over several years through SoTL - led to this team's advising Design educators around the world during the COVID-19 pandemic on the role of virtual design studios in remote Design education.

A longitudinal project (such as [D1]) interspersed with dissemination and engagement with peers provides opportunities to the SoTL project team to reflect on the SoTL inquiry, strengthen the interpretations of the data, and to iteratively make enhancements/changes to the SoTL project's research design.

A culture that supports SoTL

A positive SoTL culture in OU's Faculty of STEM has been both an enabler and an impact of the eSTEeM supported SoTL activity. Over the years, eSTEeM has helped foster SoTL culture through its support, by giving visibility to SoTL practice, by building a community of SoTL educators, and by celebrating SoTL. This positive SoTL culture has encouraged and enabled educators to undertake SoTL; eSTEeM now has a portfolio of over 200 projects.

Each completed SoTL project has also fostered SoTL culture. In the case studies in the compendium, the evidence, and reflections of the project leads (for example, in [J1] and [J6]) have shown that one of the key impacts has been the promotion of SoTL culture. In the case studies, the project teams discuss how their projects have led to other educators engaging in SoTL. The eSTEeM supported SoTL practice in STEM has inspired other units in the OU to set up their own centres for supporting SoTL in their disciplines.

6.2 Strategies for planning and generating impact

In addition to the list of enablers in the previous section, we outline some strategies for planning and generating impact in this section.

Connecting to the aim of the SoTL project

It is crucial that the aim of the SoTL project[90] is clearly understood, articulated, reflected upon from time to time, and communicated. The aim is the key foundation of the project, and the outputs, outcomes and eventual impact will be linked back to demonstrate the achievement of the aim and objectives for the project's stakeholders and target beneficiaries.

As Trisha Poole states in her blogpost[91] that it is vital to connect with the aim and objectives of the SoTL project with what is being observed during the intervention and to ensure there is robust evidence to support the achievement of the aim and objectives:

Thinking about your original SoTL problem, challenge, or opportunity, and considering where it is at now, what are your objectives and what are the indicators that will evidence the achievement of these objectives? What data will support the evidencing of these indicators?

Communicating the context of the SoTL project and the impact

A SoTL project is conducted in the context of a module, discipline, institution, etc. and, therefore, the occurrence and evidence of impact is context dependent. Therefore, when disseminating the project's outputs, sufficient information should be provided of the context. Context is the setting in which an intervention or an evaluation takes place, and which is likely to influence performance and results. For example, in SoTL, the context implies the situation that led to the formulation of the SoTL inquiry, the details of the department or school and the institution, discipline, module of study, level of study, and demographics of students.

Further, it is useful to describe the environment in which the SoTL project was (or is being) conducted. The environment of a SoTL project implies the influences related to the discipline, culture of an institution, the political and economic climate, and quality and regulatory frameworks.

The transparency of the context and the environment in the dissemination activities and materials will influence and aid the process of uptake of the outputs of a SoTL project in another context by other educators.

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90 'Aim of the inquiry' *in* 'Scholarship of Learning and Teaching in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109157&section=3.1

91 How do I know whether my SoTL-based intervention worked? https://www.trishapoole.info/news/evidencing-impact

Aligning SoTL with the strategic priorities of the institution

For SoTL to be impactful and sustainable, it is vital to link the SoTL inquiry (wherever possible) to the departmental and institutional priorities for student support, learning and success (Schroeder, 2007; Marquis and Ahmad, 2016), to the teaching and learning plan of the institution, or institutional targets such as those related to widening participation, student attainment and student retention.

Making links between strategic priorities at a local (within a School, Faculty and institution) or national level can assist in identifying the stakeholders and possible beneficiaries particularly at the decision-making and policy levels. Further, the likelihood of the SoTL enquiry to generate impact and to sustain the impact beyond the funding period of the SoTL inquiry will be enhanced, if it's situated within the strategic priorities of the school, or the institution, or the HE sector. Mengel (2016) argues that SoTL will only be sustainable if it is strongly situated and anchored in the strategic plans of the units/departments and institution.

Identifying stakeholders

At the time of writing the project proposal, it will be useful to consider who would be interested in the outcomes of the SoTL project and who will directly benefit from the project findings. The 4M framework discussed in **Section 3.2** can serve as a useful guiding framework to think about the stakeholders. A typology of stakeholders is also provided in the Session 3, Section 2 of OU's BOC on SoTL: 'Stakeholder analysis for a SoTL inquiry'[92] which may help to conduct stakeholder analysis.

Another way is to draw up a list of stakeholders as per their roles and to consider their involvement in the SoTL inquiry for generating impact:

- *Participatory role:* Which stakeholders will be able to participate in the project as active project team members? For example, if the SoTL project focuses on a specific module, then it may be helpful to have members of the module team, or the module team chair participate in the project. The module team could help in providing access to students for the empirical investigations, if required, and could also help make the necessary changes to the module in response to the outputs of the SoTL inquiry.

- *Advisory role:* Which stakeholders could engage with a project in an advisory role? For example, an experienced SoTL practitioner who could be a project mentor, or a colleague in another School/Faculty who could be an advisor and bring a different disciplinary perspective to the SoTL inquiry.

- *Advocates:*[93] These are people who might help to reach different audiences by acting as advocates for the SoTL work. These include students who are acting as co-investigators in a SoTL project and may influence fellow students to participate in the research; or head of the unit or department or people in power who could help in setting up cross-disciplinary links with educators for collaborative SoTL or influence the change in policy based on the results of the SoTL project.

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92 'Stakeholder analysis for a SoTL inquiry', *in* 'Scholarship of Learning and Teaching in STEM, Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109157&section=2

93 The roles of advocates and amplifiers are derived from the blogpost by Charlie Rapple, Research communication: who, what, where – part 1, https://blog.growkudos.com/news/research-communication-who-what-where-part-1

- *Communications role:* Which stakeholders would like to be kept informed, how often and how? For example, the funding body may ask for formal reports at regular intervals. The Head of School or Director of Teaching may like regular updates of SoTL projects via presentations to the school.

- *Amplifiers:* There are 'influencers' who can help amplify the SoTL project in the community or in social media. These are experienced and well-known educators who have a following/standing in the SoTL community and in social media. Building visibility and recognition of the project via amplifiers can facilitate impact.

- *Beneficiaries:* Who will directly benefit from the project? Who will use or adopt the results of the project? The impact plan or the impact statement for a project proposal will be driven by the possible impact for the beneficiaries.

- *Obstructors:* Who could obstruct the project? How will the opposition be managed? What might turn them around to support the project? How will the conversations be managed? How will the power dynamics be managed?

It may be useful to revisit the list of stakeholders and their roles from time to time during a SoTL inquiry. This exercise will also help to check whether the impact plan needs to be revised or adjusted for individual stakeholders.

Being realistic and specific

SoTL researchers should be realistic and specific when formulating recommendations and advocating for changes based on their SoTL research. Specificity and realism will ensure that the recommendations have explicit pathways for adoption in other contexts. Researchers should be both clear and honest about resources required (for example, time, budgets) – to give other educators the clarity to use and adapt the outcomes in their contexts.

In eSTEeM funded projects, the end-of-project report provides useful narrative related to the challenges of conducting the inquiry and deep insights into how the inquiry was formulated and run. We (the authors of this guide and compendium) have used the end-of-project reports of the SoTL projects as one of the key resources for developing the case study narratives in the compendium (Minocha and Collins, 2023).

Going public

'Going public'[94] is one of the key principles of SoTL. Sharing the outputs of a SoTL inquiry is an essential part of being open to critique, to raise the profile of the SoTL project, and to create opportunities for uptake of the project's outcomes.

Going public involves sharing the outcomes through internal workshops, presentations, and reports initially, and serves as a preparation for scholarly publications in peer reviewed journals and conferences. Educators may also choose to disseminate findings in specific disciplinary community venues, depending upon the audience of the SoTL inquiry and its outputs.

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94 'Making SoTL public' *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109326&section=1

In keeping with the ethos of SoTL, reflective writing and reflective accounts in dissemination will be useful in capturing and sharing with others the complexities of the research processes, the experiences, analyses, outcomes and challenges of learning and teaching in higher education (Cook-Sather *et al.*, 2019). In Session 6 of the OU's BOC on SoTL[95], we discuss several strategies for making SoTL public which may be particularly useful for educators who are new to SoTL.

When going public, adhering to the ethical considerations of the SoTL research is crucial. For example, if anonymity of participants had been agreed, then the reporting, photography, and so on should be anonymised.

Sharing findings of SoTL strategically

During stakeholder analysis and at the time of planning for impact, SoTL researchers should identify specific individuals or disciplines who are positioned to apply the research findings or implement recommendations.

SoTL researchers should tailor the presentations of the SoTL inquiry's findings to suit each of the audience groups that they have identified. Further, it may help in the uptake of the findings for possible impact if the results and recommendations of the inquiry are situated in the relevant extant literature.

Receiving the questioning of SoTL project's findings with an open mind

SoTL researchers should realise that institutional processes and policies may not be changed easily, and, therefore, they should be open-minded to receiving questioning of the findings of their SoTL initiatives. Similarly, it is important for other educators, decision-makers, and policy makers in an institution to be open-minded when a SoTL project's findings calls into question longstanding processes or policies.

It is important that SoTL researchers communicate the evidence of their SoTL inquiry effectively, and that the stakeholders including decision- and policy-makers entertain new possibilities, so that any constraints and opportunities for change can be explored meaningfully.

Using social media to create community and connection

The use of social software such as Facebook, Twitter, LinkedIn, YouTube to disseminate SoTL enables practitioners to be more 'open' in disseminating their research, to reach beyond existing academic networks, and to connect with a wider community. For example, Twitter can be used to make the community aware of project-related blogposts, publications, and upcoming events.

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95 'Strategies for confronting the challenges to making SoTL public' *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109326&section=1.1

McCarthy and Bogers (2023, p. 154) state:

Academic openness is a research orientation that leverages insights and expertise from different academic and non-academic stakeholders to co-design, co-produce, and co-assess research that advances academic inquiry and impact … academic openness complements the isolated and focused elements of closed research vital to producing high-quality impactful research.

eSTEeM supports the dissemination of SoTL outputs by showcasing individual SoTL projects, practitioners and events through its Twitter account and YouTube channel[96]. Active social media engagement by individual educators requires time and requires knowledge of which social media platform serves which purpose[97] (Moore *et al.*, 2022). Further, using social media for academic/professional purposes and establishing a professional online presence or digital identity requires digital competence and awareness of ethical considerations (Minocha and Petre, 2012).

Active social engagement, therefore, requires training, planning and sustained effort, and brings with it the responsibility to follow the social media guidelines of the institution and the funding body. It may be worth bearing in mind that from the visibility of a SoTL project in social media, it can't be presumed that SoTL has had an impact. Someone 'liking' a tweet or retweeting doesn't equal impact.

Smith and Hayman (2022, p. 50) discuss about strategic digital engagement for impact:

Creating pathways to impact is about more than the number of downloads, followers, likes, or shares. It's about using our capabilities as networked scholars for connecting people within and beyond academia to build new understandings, experiences, and approaches in ways that lead to positive changes in the world around us.

Using the 4M framework to plan SoTL dissemination

The 4M framework considers micro, macro, meso and mega level of dissemination[98]. Examples of micro dissemination include sharing a project within the school, or writing a blogpost, or presenting a poster. Meso dissemination will involve activities such as organising a work-in-progress workshop, participating in internal learning and teaching or SoTL events (Hamilton and Simmons, 2021), or publishing a work-in-progress paper or writing up a literature review and making it available to the community, or actively participating in the social networks to make the community aware of the SoTL project.

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96 eSTEeM on Twitter and on YouTube, https://twitter.com/ou_esteem and https://www.youtube.com/@ouesteem8907/videos

97 What Works; Engaging the public through social media, https://www.publicengagement.ac.uk/whats-new/news/new-guide-engaging-public-through-social-media

98 'Dissemination', Scholarship of Teaching and Learning, The WATT WORKS quick guides, https://lta.hw.ac.uk/resources/scholarship-of-teaching-and-learning/

Macro dissemination would be to submit reports for institutional level dissemination or showcasing the project in conferences. Mega dissemination would be to disseminate the end-of-project report to an external audience or to submit paper(s) to journals.

The 4M framework can also be used to structure and communicate the impact of a SoTL inquiry – that is, the impact at each of the four levels (Friberg and Chick, 2022).

Keeping a record of the evidence of impact

Online tools such as Microsoft's OneNote, or Google Keep, or Evernote[99] can be used to keep a record of the reflections[100] throughout the SoTL project and for re-visiting the reflections from time to time. These tools can be helpful to keep a record of the evidence of impact.

As a supplementary resource to this guide, we have developed **'SoTL impact evaluation workbook'**[101] which is designed around the Impact Evaluation Framework (IEF). This workbook can be used to plan, reflect on, monitor, and evaluate the impact of a SoTL inquiry and to record the evidence of impact.

The SoTL project team should allow for unanticipated impact and record the context in which such impact occurs and consider how it can be best communicated to the intended audience(s).

There are ethical considerations involved in recording and disseminating the evidence of impact. For example, an educator in another institution may share over email with the project lead on how the outputs of a SoTL project have been taken up in their discipline or institution and the corresponding change that has happened as a result. With informed consent from this external educator (and with guidance from the institution's ethics committee), the SoTL educator/project team can record this evidence of impact.

The ethos of empathy

For impactful SoTL, it is important to consider the requirements and perspectives of the stakeholders – students, other educators, line-manager, policy makers, and so on. For example, how student experience could be improved; or how do I present the results of the SoTL project that it is easy for other educators to use and adapt the intervention in their contexts; or what evidence will help the policy maker's decision-making?

When Mark Reed of Fast Track Impact[102] was asked to choose one piece of advice for researchers who want to increase the impact of their research, he replied[103] that the word 'empathy' sums up his advice.

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99   Impact tracking made easy with Evernote, https://www.fasttrackimpact.com/know-your-impact

100 How do I reflect in and on my SoTL practice, https://www.trishapoole.info/news/how-do-i-reflect-in-and-on-my-sotl-practice

101 This resource is available along with the guide at: Minocha, Shailey and Collins, Trevor (2023). *Impact of Scholarship of Teaching and Learning: A guide for educators*. The Open University, Milton Keynes, UK, https://doi.org/10.21954/ou.ro.000155c1

102 Fast Track Impact, https://www.fasttrackimpact.com

103 Without empathy impact is meaningless, https://www.youtube.com/watch?v=tfHLMxaPfvs

By empathy, Mark implies:

putting yourself in the shoes of the people who might benefit from or use your research in some shape or form… Without empathy, impact is empty, it is meaningless and could potentially go badly wrong. With empathy you can genuinely connect with people and achieve lasting impact.

In the next section, we discuss the implications of the impact evaluation initiative.

6.3 Implications of the impact evaluation initiative

The impact evaluation initiative that led to the 16 case studies may inspire educators in the following ways.

- The narrative of impact and the associated evidence in the individual case studies may help educators determine whether there is a possibility to transfer or apply any aspects of the SoTL initiative in their contexts.

- The case studies can be used in professional development on aspects such as how to evaluate, communicate and sustain impact.

- Educators can apply and adapt the case study methodology of the impact evaluation initiative for reporting impact of SoTL in their contexts.

- The discussion on the impact of SoTL may motivate colleagues to plan for impact when they are setting up a SoTL inquiry and applying for funding. The IEF in **Appendix 1** can serve as a useful resource to identify the various types of impact a project could have.

- The compendium of impact case studies (Minocha and Collins, 2023) and the analyses of impact in this guide may motivate educators to make SoTL a core part of their professional roles.

We hope that the impact evaluation initiative will motivate the leadership within an institution and in the HE sector to promote a culture of SoTL. An acknowledgement of the role SoTL plays in learning and teaching enhancement can foster collaborations across units and disciplines, expand educators' professional networks, and result in cross-disciplinary and pan-university SoTL.

In the next section, we discuss the challenges to generate and sustain impact in SoTL.

6.4 Challenges to generating and sustaining impact of SoTL

From our conversations with SoTL practitioners while consolidating the case studies and from the literature, we outline several challenges that SoTL practitioners may face in generating and sustaining impact.

Time constraints

Time is one of the most significant barriers to impact. Disseminating for impact, evaluating for impact, collecting, and recording evidence of impact, analysing the evidence, and reporting impact takes time.

For example, disseminating is one of the pathways to impact. Educators may be able to fit in presentations at events or running a workshop in their busy teaching schedules. However, writing a journal paper or writing in a form that can facilitate uptake of the outcomes of SoTL at the end of the project can be resource-intensive, and educators with heavy teaching loads and other priorities find it hard to 'close' their projects through formal dissemination routes.

Lack of continuity of funding/resources

When the formal tenure of a project ends, the project lead may lose resources such as a research assistant, funds, and even time in their workload plans. Hence, the dissemination efforts (such as presenting at a conference) and evidence collection for impact (for example, interviewing the beneficiaries) stall due to lack of resources.

Change in situation

Colleagues often move to other projects, or take up additional teaching responsibilities, or their roles may change such as moving to managerial positions which may affect their dissemination efforts on the completed SoTL projects.

Delay in dissemination

If the outcomes are not disseminated at the 'right time' when the academic community could possibly benefit the most from the lessons learned, the impact of a SoTL inquiry may not happen.

Not being able to operationalise the outputs or recommendations

If the outputs of a SoTL inquiry indicate that some changes need to be made, such as, changing the study calendar, or some content of a course or assessment, colleagues may not have the time to operationalise the outputs or recommendations of a SoTL inquiry. It might not be possible to operationalise some of the outputs as the changes may take time, require funds, and approvals from faculty or institutional curriculum committees.

If the outputs are not operationalised, then a SoTL inquiry may not be able to complete the cycle of implementing the recommendations and evaluating the impact.

Not being able to effect change

We have encountered projects and situations where the SoTL lead/project team have come up with evidence to effect change but the alterations required are not made. For example, if the SoTL project's team members are not a part of the module team, they may not be able to convince the module team to spend time and other resources to make changes, such as in the assessment and curriculum, despite having the evidence from the SoTL inquiry.

While the SoTL project is being conducted, regular dialogue with module team members or other stakeholders who are in positions of power can influence change. Including the key stakeholders who can influence change as advisors within the SoTL project team can help develop a mutual understanding, and subsequently lead to collaborative implementation of the evidence-based changes in modules, programmes, and so on.

6.5   An action agenda for SoTL to make an impact

Based on the impact evaluation initiative and associated discussion in the literature (for example, Huber and Hutchings, 2005; Hutchings *et al.*, 2011), we recommend the following action agenda for impactful SoTL for the institution's leadership.

Funding: Increase the capacity of educators as independent SoTL researchers. This will be possible by supporting SoTL practice through funding and opportunities for professional development – just as eSTEeM does.

The 2020 report by the 'National Forum for the Enhancement of Teaching and Learning in Higher Education'[104] mentions about funding influencing the achievement of impact (p. 28):

The allocation of funding, in itself, allows for space and time to be created for focused teaching and learning conversations and the exploration and embedding of innovative practice. Large-scale investment in teaching and learning enhancement demonstrates the value placed on teaching and learning in higher education by decision-makers at system level and this can have a positive influence on institutional priorities.

However, for the funding to have maximal impact, there is a need for support structures, such as the mentoring and project management infrastructure provided by eSTEeM.

Time: Support faculty members in engaging in reflective practice and pedagogical research in their disciplines. It is important that educators are given the time, space and training to engage in reflective practice on how they can improve the teaching and learning.

SoTL centres: Set up dedicated centres to support SoTL in different disciplines in an institution – like eSTEeM and other scholarship centres at the OU who can facilitate inter-disciplinary collaborations.

Collaboration: Recognise that networking, collaboration and inter-disciplinary or inter-unit collaborations within an institution and externally can help foster synergies in SoTL research and allow for SoTL projects to build on each other for the collective progress and benefit of the entire HE community. Establish occasions and structures for sustained, substantive and constructive discussions about student learning and how to improve it: for example, seminars, working groups, regular meetings.

Student-educator partnership: Promote student-educator partnerships in teaching and learning. Include students in discussion about learning, for example, as collaborators in SoTL projects and as participants in department and university-wide forums on learning.

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104 Learning about Impact and Looking to the Future: Teaching and Learning Enhancement Fund Projects 2014–18, https://hub.teachingandlearning.ie/resource/learning-about-impact-and-looking-to-the-future-teaching-and-learning-enhancement-fund-projects-2014-18/ or https://tinyurl.com/yckufjf3

Ethics: Support the ethical review of SoTL projects through the institutional research ethics committee (which may be oriented towards disciplinary research rather than SoTL).

Strategy: Connect the SoTL activity to larger, shared agendas for student learning and success. Incorporate SoTL and its role within the strategic plans of the university such as the Teaching and Learning plan or the Student Experience plan. Consider every school/academic department to have a scholarship plan, which can help guide and shape scholarship for impact within the school and discipline. Develop a plan and timeline for integrating SoTL into an institution's culture, and monitor progress.

Dissemination: Support the dissemination of SoTL projects and their impact for uptake of outcomes in other disciplines wherever possible and for influencing policy making at an institution level. Encourage new genres and forms to document the work of teaching and learning such as use of social media (for example, blogposts), videos and open access reports. Build and maintain the infrastructure needed to make pedagogical work of high quality available and accessible to all, such as via institutional repositories for SoTL outputs.

Career advancement: Recognise SoTL practice and impact in criteria related to career advancement of educators such as rewards and promotions.

Franks and Payakachat (2020, p. 1174) discuss about reducing the ambiguity in the rewards and promotion criteria for SoTL to show commitment to it:

Most importantly, we encourage these leaders to reduce ambiguity in promotion and tenure criteria and therefore reduce the individual biases that may exist regarding the value of SoTL as a legitimate scholarly avenue for advancement. A commitment to the SoTL, reflected explicitly in promotion and tenure policy and guidance documents, assures faculty members that their research will be valued and rewarded.

Henry *et al.* (2021) assert that it is important to question whether the staff who conduct annual performance reviews or who are involved in the promotion processes value SoTL, or do they consider SoTL as a lesser form of scholarship in comparison to "real" disciplinary scholarship. Henry *et al.* (2021, p. 17) question:

If SoTL is not valued as much, and if women are disproportionately doing SoTL work, how does that, long term, reproduce gendered inequalities and inequities in higher education?

Smith and Walker (2022) state the importance of training of line managers and promotion committees in the evaluation and support requirements of educators engaging in SoTL.

Inform future initiatives: Instead of inferring impact only for accountability of funding, focus on the benefits of SoTL for student outcomes, and how any lessons about planning for impact, generating impact and reporting impact can be recorded for the benefit of future learning and teaching enhancement initiatives.

Simmons (2016) noted that SoTL predominantly remains a micro-level (of the 4M framework) movement and there is a disconnect between practices at the micro (individual) level and SoTL's institutional impact.

Simmons and Taylor (2019, p. 13) emphasise the role of strong leadership for supporting impactful SoTL practice:

The SoTL will be best supported when leaders in diverse roles develop capacity, provide resources, create community, and build culture through engagement, connection, collaboration, and advocacy at all levels [of 4M framework] in our institutions.

6.6   Concluding remarks

Despite the challenges outlined above, if educators can integrate SoTL within their academic practice wherever possible and ethically, it may help in improving learning and teaching. Using learning analytics and data collection methods that are not too time-intensive, such as collecting regular feedback from students at the end of a session or employing reflective journals[105] to gather insights into student learning, can help foster effective SoTL practice. Sometimes even tiny improvements in the design and delivery of teaching can generate significant impact.

Even if there are challenges in realising impact and not every inquiry will have a demonstrable impact, SoTL practice is nevertheless beneficial for the project team and students. SoTL can act as a source of satisfaction for the educators that they are undertaking initiatives to improve student learning and engagement, however small and focused these initiatives may be. For students, knowing that their educators are engaging with SoTL practice and that efforts are being made to evaluate and improve student experience can be very reassuring.

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105 Reflective journals and learning logs, Center for Innovative Teaching and Learning, North Illinois University, https://www.niu.edu/citl/resources/guides/instructional-guide/reflective-journals-and-learning-logs.shtml

7. Toolkit for SoTL impact

Every SoTL project and the context in which the SoTL inquiry is conducted are unique and, therefore, there are no set procedures or guidelines which, if adhered to, will guarantee that a SoTL project will have an impact.

In **Table 7.1** below, we list a set of resources in the form of a toolkit, which may guide SoTL researchers to plan a SoTL project for possible impact and report on the impact of their SoTL projects. Aspects of this toolkit can also be employed for professional development (training) of educators aspiring to engage with SoTL and in generating impact.

Table 7.1 Toolkit for SoTL impact

Activities	Recommended resources
Designing a SoTL inquiry	Seven-criteria framework to guide the design and evaluation of a SoTL inquiry (The OU's Badged Open Course on SoTL: Session 3, Section 4[106])
Planning for impact	Planning for SoTL impact workbook (Guide: Supplementary resource[107]) SoTL impact evaluation workbook (Guide: Supplementary resource)
Monitoring impact	Planning for SoTL impact workbook (Guide: Supplementary resource) SoTL impact evaluation workbook (Guide: Supplementary resource)
Evaluating impact	SoTL impact evaluation workbook (Guide: Supplementary resource) *Retrospectively*: Self-evaluation question-driven form based on the Impact Evaluation Framework (IEF) (Guide: Appendix 3)
Recording evidence of impact	SoTL impact evaluation workbook (Guide: Supplementary resource)
Reporting impact	Case study methodology and case study template (Guide: Section 4)
Disseminating impact	4M framework to structure the impact at the four levels (Guide: Section 3.2) Making SoTL public (The OU's Badged Open Course on SoTL: Session 6, Section 1[108])
Training for impact of SoTL	Impact of SoTL and impact evaluation of SoTL (Guide: Section 3) 'Compendium' of case studies (Minocha and Collins, 2023) Impact evaluation framework (Guide: Appendix 1)

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106 'Designing a SoTL inquiry', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109157&section=4

107 The two supplementary resources or workbooks are available along with the guide at: Minocha, Shailey and Collins, Trevor (2023). *Impact of Scholarship of Teaching and Learning: A guide for educators*. The Open University, Milton Keynes, UK, https://doi.org/10.21954/ou.ro.000155c1

108 'Making SoTL public', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109326&section=1

8.   Conclusions

We have seen in the compendium (Minocha and Collins, 2023) and in this guide that SoTL is an essential research-informed reflective practice that educators should endeavour to participate in. SoTL helps to understand how students learn and involves assessing the efficacy of academic practices of educators for student learning and engagement.

In this section, we discuss some of our key reflections on the impact of SoTL.

8.1   Reflections on the impact of SoTL

Drawing on from a variety of resources[109] related to impact in research and scholarship and our experiences in eSTEeM and in the impact evaluation initiative, we describe some key reflections related to the impact in SoTL.

Reading about SoTL

Just as dissemination is useful for connecting with the wider academic community, so is reading SoTL papers in journals such as Teaching & Learning Inquiry[110] and the Journal of the Scholarship of Teaching and Learning[111].

Reading about SoTL will help SoTL practitioners or those aspiring to engage with SoTL to relate the literature and projects in other institutions to their academic practice and review their approach to teaching (Chick, 2017). Further when educators share with others what they have been reading about SoTL, it initiates discussions on how SoTL practice in another setting could be applied in their own context.

As Jennifer Friberg says in her blog post[112]:

If you read SoTL research and then engage in discussions about what you've learned with others, you (very likely) consider your readings more deeply and puzzle over application of the study's outcomes more thoroughly. Sharing leads to a deeper understanding – and perhaps use – of what we've read.

Ethical considerations

Whether it is conducting SoTL research or disseminating the findings, or collecting evidence of impact, or reporting the impact – ethical considerations should underpin all these activities.

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109   For example, Learning about Impact and Looking to the Future: Teaching and Learning Enhancement Fund Projects 2014-18, https://hub.teachingandlearning.ie/resource/learning-about-impact-and-looking-to-the-future-teaching-and-learning-enhancement-fund-projects-2014-18/ or https://tinyurl.com/yckufjf3

110   Teaching & Learning Inquiry is the open access journal of the International Society for the Scholarship of Teaching and Learning (ISSOTL), https://journalhosting.ucalgary.ca/index.php/TLI/about

111   Journal of the Scholarship of Teaching and Learning, https://scholarworks.iu.edu/journals/index.php/josotl

112   Giving the reading of SoTL impact, https://illinoisstateuniversitysotl.wordpress.com/2018/04/16/giving-the-reading-of-sotl-impact/

In Session 4 of the OU's BOC on SoTL[113], we discuss the key ethical considerations when conducting a SoTL inquiry such as the issues around the involvement of students, use of student data, and the dual role of a SoTL researcher – as an educator and researcher. We also discuss the ethical criteria of informed consent, right to privacy, and protection of harm which need to be adhered to when conducting a SoTL inquiry and reporting its findings. An ethical research design should describe how the educator minimises risk to students while also maximising student agency and relational trust (Bunnell *et al.,* 2022).

The collection of evidence of impact should be based on the same ethical considerations that govern the research process itself (Reed *et al.*, 2021) and any additional guidance from the institution's research ethics committee for impact evaluation.

Bunnell *et al.* (2022, p. 144) discuss about establishing trust in the community:

As learners and teachers, we are in community and relationship with each other, and our ethical practices in SoTL should seek to care for and nurture these relationships.

Dissemination of SoTL outputs

Early dissemination is helpful for the SoTL project team to firm up the project's aims and clarify objectives and possible outcomes. Ongoing dissemination through a poster, or an infographic[114], or a blogpost, or a video, or a podcast, or a work-in-progress paper can help gather feedback from colleagues and other stakeholders and generate interest in the project. Ongoing dissemination ahead of publishing the results in a conference or a journal will help in generating discussions and receiving feedback before formal publication.

Dissemination of SoTL enables spread of good teaching practices and is key to SoTL research improving institutional quality (Poole and Simmons, 2013). Dissemination facilitates social network development (Williams, *et al.*, 2013). Poole and Simmons (2013) argue that too much SoTL remains visible only at the micro level of the 4M framework and is not adequately visible at meso or macro levels, and they advocate a need for better in-house dissemination of and recognition for SoTL.

Disseminating SoTL findings in conferences, journal papers, and book chapters (preferably in open access books wherever possible) for peer review and uptake in different contexts is a pathway for impact of SoTL.

Altmetrics can provide some evidence of how the SoTL outputs are being used by peers in the community. Altmetrics[115] or alternative metrics are complementary to traditional, citation-based metrics that measure the uptake of scholarly output by authors in media outlets, social media, or blogposts.

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113 'Students as partners and ethical considerations in SoTL research' *in* 'Scholarship of Teaching and Learning in STEM, Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109324

114 What is an infographic? Examples, Templates & Design Tips, https://venngage.com/blog/what-is-an-infographic/

115 What are altmetrics? https://www.altmetric.com/about-altmetrics/what-are-altmetrics/

Nature of SoTL impact

The case studies featured in the compendium have demonstrated that SoTL can have an impact within a module, across different modules (in the same or other disciplines), within an institution or externally.

Not every SoTL inquiry may have an impact beyond the local context - yet it may result in significant benefits for the target audience. For example, an inquiry focused on group work in a module may result in increased student engagement with group work in the module. Such an inquiry with impact at a local level can be equally noteworthy and consequential as an inquiry that realises benefits at faculty or institutional level.

Similarly, the scale of a SoTL inquiry doesn't constrain the level of impact. Even a small-scale inquiry can sometimes lead to impact at national and international levels. Whatever be the scope and scale of SoTL practice, its purpose is to strengthen the learning experience of students and to improve an educator's academic practice through a critical reflective and reflexive nature of the process of SoTL[116].

Therefore, it is not the level of impact or the scale of the inquiry that is important; the essential aspect is that a SoTL inquiry is conceptualised and planned with some impact in mind.

Toolkit for SoTL impact

Impact in SoTL practice is a complex phenomenon. Different initiatives can result in different forms of impact as the compendium of case studies has shown. There are also disciplinary and institutional contexts that may determine how the impact is perceived and communicated.

The IEF and the case study template of the impact evaluation initiative can be used and adapted in other impact evaluation contexts. In addition, there are supplementary resources to this guide which we introduced in **Section 1.3**. We have brought the various resources together into a 'toolkit for SoTL impact' in **Section 7**.

Transferability of a SoTL initiative

Sometimes it is only the ethos of a SoTL inquiry in one context that is transferred to another discipline and context. A complete transferability of a SoTL initiative may not always be possible since student profiles such as background and skills, the learning and teaching contexts (for example, distance learning versus hybrid learning), the subject area or discipline and study pathways will guide the adaptation of a successful SoTL initiative in a new context.

If the SoTL inquiry's focus is narrow and concentrates on a specific set of students or a particular situation, then it may not be possible to generalise the results for uptake by other educators. Yet even with a narrow focus, an inquiry may have generated substantial impact for the specific context (for example, a particular set of students) in which it was conducted.

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116 'Reflection, critical reflection and reflexivity', *in* 'Scholarship of Learning and Teaching in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109160&section=3

Culture of evaluation

A culture of evaluation and evidence-informed approaches within an institution may foster SoTL. Professional development opportunities will help towards a growing awareness of evaluating learning and teaching amongst educators, such as:

- critical reflective practice and self-evaluation

- evidence-based academic practice and methods for evaluation

- adaptation of research methods from core disciplines of the educators for evaluating pedagogical practices

- impact training adapted to disciplinary contexts

- integration of evaluation practices[117] in curriculum design and development.

Developing a culture of evaluation and innovation[118] will help foster an evaluative mindset of educators[119]. SoTL will, therefore, be perceived as one of the evidence-informed approaches for effective academic practice and for enhancing student outcomes.

SoTL impact culture

Inclusion of SoTL's impact in criteria for recruitment, promotion, and annual appraisal, celebrating impact in showcase events and through impact awards, inclusion of impact in workload allocation models, and training for impact will help foster impact culture in an institution. However, too much focus on extrinsic incentives is likely to instrumentalise impact and can demotivate educators[120].

In parallel to the incentives to show that SoTL is valued and will be rewarded, efforts should be directed to developing a shared purpose towards an institution's strategic goals for student outcomes, and strategic plans related to access and participation, teaching and learning, and scholarship.

If a critical mass of staff is intrinsically motivated to pursue SoTL, the continued leadership and commitment at departmental and institutional levels, from disciplinary societies, funders, and governing and accreditation bodies will facilitate growth and sustenance of SoTL's impact (How, 2020).

Role of disciplinary associations

Mighty (2013) states that one of the most significant sources of leadership for the promotion of SoTL is the disciplinary association. When disciplinary associations accept conference and journal papers with a SoTL focus or have a workstream dedicated to SoTL in the discipline, these measures exercise strong influence on the growth of SoTL. Involvement of disciplinary associations in SoTL helps to raise the profile of SoTL by sending a very powerful message about the relevance and importance of SoTL in the disciplines.

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117   Working together on access and participation evaluation, https://wonkhe.com/blogs/working-together-to-take-evaluation-seriously/; also, see The Evaluation Manifesto, https://evaluationmanifesto.wordpress.com

118   Creating a culture of innovation, https://er.educause.edu/articles/2022/8/creating-a-culture-of-innovation

119   Evaluative mindset, https://blog.shu.ac.uk/steer/evaluative-mindset/

120   How to write a research impact strategy, https://www.fasttrackimpact.com/impactstrategies

Educators are influenced to pursue the types of activities that their disciplinary association values and, hence, a disciplinary association plays a vital leadership role in fostering SoTL (Mighty, 2013) and its impact.

Communication of impact

While planning to capture and communicate short- and long-term impacts, it is helpful to remember that some impacts may be unanticipated and unintended. There could also be negative impact[121] – for example, an intervention results in student dissatisfaction or negatively affects student attainment. A regular review of the project such as via Theory of Change or by applying the IEF, or by reflection on the evidence being collected by the SoTL team can help to ensure that any unexpected impacts can be identified and communicated. We have developed **two workbooks** to guide the application of Theory of Change and IEF, respectively, for planning, evaluating, and monitoring SoTL's impact. We have provided these workbooks as supplementary resources[122] to this guide.

An expectation when evaluating and communicating impact is that a clear link can be demonstrated between the intervention and the captured impact. However, it may not always be possible to establish clear causal links if the environment of a SoTL inquiry is constantly changing (for example, during the COVID-19 pandemic, or varying students' needs and expectations over time). It is, therefore, important to critically reflect on the impact claims and report the impact and the characteristics of the environment in a transparent manner. Being transparent regarding what has been found, and enabling audiences to make their own judgements, is fundamental to clear communication of the impact of SoTL.

Measurement of impact

Engaging with SoTL can be challenging for educators as the HE sector worldwide is in a state of rapid change. Even if educators engage with SoTL, the challenge of generating impact and evidence to a particular standard can be an additional pressure on an educator's time and may even be perceived as constraining their creativity and thinking time.

There is, therefore, a concern that increasing quest for impact at institution level in HE and integration of impact in the narratives of accountability and performance measurement could be counter-productive to SoTL, just as the metric-driven impact agenda in research is adversely affecting the research culture (Reed and Fazey, 2021). A focus on metric-driven impact assessment of SoTL may restrict the creativity and innovation of educators and limit the scope of individual SoTL inquiries which, ultimately, would negatively affect an educator's reflective practice and student experience. Hence, the drive towards metric-driven impact evaluation should be approached with caution and care.

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121 Negative Impact – Is it possible to manage potentially harmful research findings?, https://blogs.lse.ac.uk/impactofsocialsciences/2019/04/03/negative-impact-is-it-possible-to-manage-potentially-harmful-research-findings/

122 The workbooks are available as supplementary resources along with the guide at: Minocha, Shailey and Collins, Trevor (2023). *Impact of Scholarship of Teaching and Learning: A guide for educators*. The Open University, Milton Keynes, UK, https://doi.org/10.21954/ou.ro.000155c1

8.2   Concluding remarks

For SoTL to make an impact and result in high-quality learning and teaching within or beyond an institution, or across a discipline or a profession requires sustained efforts for building the capacity for SoTL.

Geertsema (2016, p. 132) points out the advantages of capacity-building for SoTL:

Such [locally-oriented] capacity building [for SoTL] will result not only in strengthening the institution, but over time in work that can become more globally oriented research, which would thereby have a larger impact beyond the institution itself.

We hope that the compendium of 16 case studies (Minocha and Collins, 2023) and the analyses in this guide have demonstrated that SoTL capacity built by eSTEeM, the OU Centre for STEM pedagogy, has resulted in impact at various levels – realising the vision that Geertsema (2016) has expressed.

Maurer (2022, p. 1) discusses that there aren't enough examples in the SoTL literature which demonstrate that SoTL-active educators serve their institutions as 'cosmopolitan assets':

using their knowledge and expertise in SoTL to not only improve their own teaching through a scholarly teaching approach but also improving the teaching of their non-SoTL-active colleagues by translating the findings of SoTL for their use and adaptation.

We hope that the impact evaluation initiative and the compendium of case studies have in some way addressed the gap in the literature and SoTL knowledge base that Maurer (2022) has highlighted.

9.   Definitions of key terms

In this section, some key terms related to impact that we have encountered in the literature are defined.

Academic impact

Academic impact[123] is defined as the demonstrable contribution that excellent research makes to academic advances, across and within disciplines, including significant advances in understanding, methods, theory, and application.

Activity

Activity is defined[124] as the actions taken or work performed through which inputs, such as funds, technical assistance and other types of resources, are mobilised to produce specific outputs.

Assumptions

A set of (untested) factors and beliefs that form the basis of the intervention logic, and factors or risks, which affect its relevance, progress or success. Assumptions are the conditions necessary for the cause-and-effect relationships between the different levels of results (that is, to move from activities to outputs, outputs to outcomes, and outcomes to impacts).

Attribution

The ascription of a causal link between observed (or expected to be observed) changes and a specific intervention.

Note: Attribution refers to that which is to be credited for the observed changes or results achieved. This definition does not require that changes are produced solely by the intervention being evaluated, rather it represents the extent to which observed effects can be attributed to a specific intervention, taking account of other interventions, confounding factors (other influences), or external shocks.

Attribution[125] is the causal link between claimed impacts and underpinning research.

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123 Pathways to impact, National Co-ordinating Centre for public engagement, https://www.publicengagement.ac.uk/do-engagement/funding/pathways-impact

124 In this section, the definitions of several terms such as activity, attributions, assumption, evidence, and impact, are from the Glossary of Key Terms in Evaluation and Results-Based Management - 2nd Edition, June 2022. Available at: https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DCD/DAC/EV(2022)2&docLanguage=en or https://tinyurl.com/yc4vm8x4

125 From Mark Reed's Fast Track Impact Training on 6 February 2023.

Beneficiaries

Beneficiaries are those individuals, groups, or organisations, whether targeted or not, and who are likely to be interested in or benefit from the proposed research[126] or from the intervention. Possible beneficiaries for SoTL are students, academic peers in the same or other disciplines, senior management in the institution, quality assurance organisations, and policy makers.

Collaborative SoTL inquiry

A SoTL project or inquiry is often carried out collaboratively[127], for example, a team may include academics and learning designers, academics of different disciplines, learning designers, a librarian, or an educational researcher working alongside an educator, and sometimes students are involved as partners in SoTL research.

Context

The setting in which an intervention or an evaluation takes place, and which is likely to influence performance and results. For example, in SoTL, the context implies the situation that led to the formulation of the SoTL inquiry, the details of the department or school and the institution, discipline, module of study, level of study, and demographics of students.

Environment

The environment of a SoTL project implies the influences related to the discipline, culture of an institution, the political and economic climate, and the quality and regulatory frameworks.

Evaluation

Evaluation is the process of assessing or determining the quality, importance, amount, or value of an initiative or intervention against some criteria or targets. Evaluation involves occasional data collection to explore whether change is being achieved and learn how to do better[128]. Evaluation also refers to the process of determining the worth or significance of an intervention.

Evaluation is defined as the process of collecting and interpreting data to assess the significance, reach and attribution of impacts from research.

Gertler (2011) defines evaluations as periodic, objective assessments of a planned, ongoing, or completed project, programme, or policy. Evaluations are used to answer specific questions related to design, implementation, and results. In contrast to continuous monitoring, evaluations are carried out at discrete points in time and often seek an outside perspective from technical experts. The evaluation's design, method, and cost vary substantially depending on the type of question the evaluation is trying to answer.

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126 Beneficiaries, https://je-s.rcuk.ac.uk/handbook/pages/GuidanceoncompletingaFellowshi/Beneficiaries.htm

127 'Collaboration in SoTL', *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109159&section=2

128 Glossary, Theory of change in ten steps, https://www.thinknpc.org/resource-hub/ten-steps/

Evaluation of impact

Evaluation of impact is defined as the process of collecting and interpreting data to assess the significance, reach and attribution of impacts from research (Reed *et al.,* 2021).

Evaluation for impact of SoTL

Evaluation for impact of a SoTL project looks at the long-term, deeper changes that have resulted from a programme of activity[129] based on the findings of this SoTL project. Evaluation involves finding out who has benefited from SoTL and how, and to collect evidence related to significance and reach of the impact. The Impact Evaluation Framework (IEF) included in **Appendix 1** is one of the frameworks to guide the evaluation of SoTL.

Evidence

Facts or information that support the validity and truth of a conclusion, assumption or assertion. Reed *et al.* (2021) refers to evidence as the communication or "demonstration" of impact based on robust evaluation.

Impact

Impact is the extent to which the intervention has generated or is expected to generate significant positive or negative, intended or unintended, higher-level effects. Impact addresses the ultimate significance and potentially transformative effects of the intervention.

Impacts are the final, wider changes that result from the programme. For example, saving in costs in running a programme due to a technological innovation.

Mark Reed defines impact as[130]:

At its most simple, we can define impact as benefit. It is surprising how much clarity it brings, when you simply ask yourself "What was the benefit?".

Impact of research

In UK's academic context, impact is defined as 'an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia'[131].

UCD Dublin Research Impact Toolkit[132] outlines five stages to achieve impact:

Inputs: What researchers need. *Activities:* What researchers do. *Outputs:* The products of research. *Outcomes:* People becoming aware of, and using, these products. They generally occur in the short- to medium-term. *Impacts:* Changes in society that result from outputs and outcomes. Typically, impacts occur in the longer-term.

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129   What is evaluation? https://www.betterevaluation.org/getting-started/what-evaluation
130   What is impact? https://www.fasttrackimpact.com/what-is-impact-subpage
131   Research Excellence Framework (REF) impact, https://www.ukri.org/about-us/research-england/research-excellence/ref-impact/
132   UCD Dublin Research Impact Toolkit, https://www.ucd.ie/impacttoolkit/whatisimpact/

Impact culture

Impact culture is defined as communities of people with complementary purpose who have the capacity to use their research to benefit society (Reed and Fazey, 2021).

Impact culture is also defined[133] as the shared, values, beliefs and norms of an academic community that support the production of (significant and far-reaching) non-academic impacts based on excellent research, which then define the collective identity of that community and distinguish the strengths and foci of one institution from another.

Impact evaluation

An impact evaluation provides information about the impacts produced by an intervention - positive and negative, intended and unintended, direct and indirect. This means that an impact evaluation must establish what has been the cause of observed changes (in this case 'impacts') referred to as causal attribution (also referred to as causal inference)[134].

An impact evaluation provides information about the impacts produced by an intervention. The intervention might be a small project, a large programme, a collection of activities, or a policy. This definition implies that impact evaluation: goes beyond describing or measuring impacts that have occurred to seeking to understand the role of the intervention in producing the impacts (causal attributions); and can encompass a broad range of methods for causal attribution (including unintended impacts).

Impact Evaluation Framework

Impact Evaluation Framework (IEF), included in **Appendix 1**, consists of 12 impact facets and their corresponding attributes for evaluating the impact of a SoTL project or intervention.

Impact of a SoTL project

The impact of a SoTL project implies demonstrable benefits to learning and teaching that are directly attributable to that project. Impact of SoTL activity is usually judged against two aspects, *significance* and *reach.* These imply how significant are the benefits of the SoTL project and for whom, and how far-reaching are the outcomes of the SoTL project.

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133 Facilitating research impact, https://www.slideshare.net/MarkReed11/facilitating-research-impact-163984834

134 Impact evaluation, https://www.betterevaluation.org/en/themes/impact_evaluation

Impact literacy

Julie Bayley and David Phipps define impact literacy[135] as:

being able to understand, appraise and make decisions about how to connect your research to the outside world.

Impact statement

Impact statement in grant applications is instrumental for showcasing the alignment between a proposed research study and the aims and objectives of a funding programme[136]. An impact statement can also inculcate a research culture in which the pursuit of knowledge is in, with and for society.

Impact strategy

Impact strategy explains what impact the research project is designed to generate, but also how this impact will be achieved.

Inputs

The financial, human, material (in-kind), and institutional (including technological and information) resources used for the intervention.

Inputs imply the resources required to achieve the programme objectives, such as funding.

Knowledge exchange

Knowledge exchange is defined by the ESRC as a two-way exchange between researchers and research users, to share ideas, research evidence, experiences and skills. It refers to any process through which academic ideas and insights are shared, and external perspectives and experiences are brought into academia[137].

Monitoring

Monitoring is a continuous process that tracks what is happening within a project or programme of work and uses the data collected to inform day-to-day management and decisions (Gertler, 2011). Monitoring tracks the performance against expected results. Usually, monitoring tracks inputs, activities, and outputs, though occasionally it can include outcomes, such as progress toward the overall goals.

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135 Bayley, J., Phipps, D. and Emerald Publishing (2018). Impact Literacy Workbook. Emerald Publishing, Bingley, UK. Available at: https://www.emeraldgrouppublishing.com/about/our-stance/our-impact

136 Planning for Impact – A framework for achievable impacts in grant applications and impact statements, https://blogs.lse.ac.uk/impactofsocialsciences/2022/06/15/planning-for-impact-a-framework-for-achievable-impacts-in-grant-applications-and-impact-statements/

137 Introduction to Knowledge Exchange and Public Engagement. What is it and why should you do it? https://info.lse.ac.uk/staff/services/knowledge-exchange-and-impact/kei-guide/introduction-to-kei

Outcomes

An outcome is a finite and often measurable change[138]. It implies what change is expected after successful dissemination and exploitation of project results to the beneficiaries and other stakeholders.

Outcomes are the changes or benefits that result, generally to the direct beneficiaries of the programme, such as increased sales or other forms of enhanced business performance resulting from an innovation, for example.

For example, an outcome of an information and advice intervention on mental health awareness to students studying at a distance might be increase in student retention. Another example of an outcome will be the number of students who have sought and accessed support in response to the mental health related information and support telephone service. In these examples, outcomes are focused on the measurable objective changes that are brought about by engagements with information and advice on mental health.

In contrast, impact refers to a much broader effect – such as the effect information and advice had on empowerment or wider life experiences of students. Impact can be conceptualised as the longer-term effect of an outcome. For example, students feel more in control of their lives, having an increased sense of happiness and/or a decreased sense of insecurity. Another impact could be these students becoming 'buddies' to other students and volunteering to support other students.

When compared to outcomes that tend to be pre-defined and can be measured objectively, the personal experiences and inherently personal nature of impact is intuitively subjective.

Outputs

Outputs are the direct products of a programme's activities and may include types, levels and targets of services to be delivered by the programme. Outputs include changes in knowledge, skills, or abilities produced by the activities. Outputs may also include changes resulting from the intervention that contribute to the achievement of outcomes.

Output is also defined as the direct result of an activity, observable by the end of the activity, such as technological progress or increased knowledge.

Pathways to impact

Pathways to impact imply the activities of the research cycle that will increase the likelihood of the intended impact. So, what will be done to ensure that potential beneficiaries have the opportunities to engage with the research? For example, disseminating the results of a SoTL inquiry and communicating the evidence of improved learning and teaching to educators who may be interested in the SoTL intervention for their own learning and teaching contexts is one of the pathways to impact.

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138 What is the difference between an impact and an outcome? Impact is the longer term effect of an outcome, https://blogs.lse.ac.uk/impactofsocialsciences/2014/10/27/impact-vs-outcome-harding/.

Process evaluation

Process evaluation[139] typically involves questioning and analysing whether an intervention is being implemented as intended; whether the research design is working; and what is working well and why.

Public engagement

Public engagement describes the myriad of ways in which the activity and benefits of research can be shared with the public. Engagement is a two-way process, involving interaction and listening, with the goal of generating mutual benefit[140].

Reach of an impact

The reach of an impact can be defined as the number, extent or diversity of individuals, groups or organisations that benefit from research (Reed *et al.,* 2021).

Reach[141] is the extent and diversity of the communities, environments, individuals, organisations or any other beneficiaries that may have been impacted by the research.

Results of an intervention

The outputs, outcomes or impacts (intended or unintended, positive or negative) of an intervention constitute the results of the intervention.

In this guide, we have used the term 'results' to mean any of these three terms, outputs, outcomes and impact, depending upon the stage of the SoTL project and its pathway to impact.

Scholarship of Teaching and Learning

Scholarship of Teaching and Learning (SoTL) is defined as[142]: systematic and ethically reasoned investigation of aspects of teaching and student learning by applying disciplinary knowledge, resulting in reflections and outcomes that are publicly shared for peer review and for others to build upon.

Self-evaluation

An evaluation of an intervention by those who are responsible for its design and delivery.

139 The Magenta Book, HM Treasury guidance on what to consider when designing an evaluation, https://www.gov.uk/government/publications/the-magenta-book

140 What is public engagement? https://www.publicengagement.ac.uk/about-engagement/what-public-engagement

141 From Mark Reed's Fast Track Impact Training on 6 February 2023.

142 'Scholarship of Teaching and Learning' *in* 'Scholarship of Teaching and Learning in STEM', Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109160&section=1

Significance of an impact

The significance of an impact can be defined as the magnitude, or intensity of the effect of research on individuals, groups or organisations (Reed *et al.,* 2021).

Significance[143] is the degree to which the impact has enriched, influenced, informed or changed policies, practices, products, opportunities or perceptions of individuals, communities or organisations.

Stakeholder

A stakeholder is an individual who applies the findings or recommendations of research. Stakeholders are sometimes referred to as 'evidence users' (Semione, 2020).

Stakeholders are people or organisations who have an interest in the research project or affect or are affected by its outcomes[144]. Stakeholders include those who are both supportive of the research, as well as those who may be less supportive or indeed critical of it.

In this guide, stakeholders are not considered a part of the core project team: they could be educators who may be interested in the project, decision-makers, and policy makers within an institution and in other institutions.

Sustainability of impact

The extent to which the net benefits of the intervention continue or are likely to continue.

Theory of change

Theory of change is a process for thinking about and describing the change you want to see; from a project or intervention and your plans for achieving t hat change[145].

Theory of change is the process by which the sequence of changes that must occur for an impact to be achieved is mapped[146]. As a part of the project proposal or at the start of the project, theory of change maps out the pathway(s) of change: problem that the research is tackling, stakeholders and beneficiaries that will be involved, the activities that will be carried out with the available resources, the outputs, outcomes and finally, the impact that will be achieved.

Validity

The extent to which an evaluation is logically and factually sound. Also, validity is used to describe the quality of data collection strategies and instruments to accurately measure what they purport to measure.

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143 From Mark Reed's Fast Track Impact Training on 6 February 2023.
144 Research project stakeholders, https://www.vitae.ac.uk/doing-research/leadership-development-for-principal-investigators-pis/leading-a-research-project/applying-for-research-funding/research-project-stakeholders
145 Theory of change in ten steps, https://www.thinknpc.org/resource-hub/ten-steps/
146 The Application of Theory-of-Change in Proposals, https://www.wrgeurope.com/article-theory_of_change.html

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Appendix 1: Impact Evaluation Framework for SoTL

The 12 facets of the Impact Evaluation Framework (IEF) for SoTL are divided into four categories:

1. Learning and Teaching
2. Transfer to others
3. Stakeholder benefits
4. Cultural and economic benefits

The facets and attributes are listed against each of these four categories in the Table below.

Table A1 Facets and attributes of IEF for SoTL

Learning and Teaching		
1 Student experience pre-registration; induction; curriculum design; design of assessment; learning design; student engagement with course content; student engagement with the technological intervention; and student satisfaction rate.	**2 Student retention and progression** student registrations; average marks as compared with previous year(s); module completion rate; module pass rate; student retention rate; and student progression.	**3 Excellence in teaching** student skills-set (e.g. academic writing; critical thinking; reflection; problem-solving; group-working; digital literacy); student employability; evidence of research-informed teaching; data for assessments (e.g. UK's TEF[148]), programme reviews and accreditation processes; inter-disciplinary collaborations in teaching; accreditation against professional standards; informing policy development internally at the level of department, faculty or University; and informing policy development externally (in another institution or in the sector).

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148 UK's Teaching Excellence Framework, https://www.officeforstudents.org.uk/advice-and-guidance/teaching/about-the-tef/

Transfer to others		
4 Discipline-based teaching, research and practice change in the ways in which subject concepts are taught; leading to discipline-based research; uptake of outputs in industry practice.	**5 Dissemination of project's outcomes** number of publications from the project; impact factor of individual journals or conferences; publications with students as co-authors; Google Scholar analytics or institutional analytics (e.g., OU's ORO[149]) on downloads of reports/publications; and sharing of novel research methods/strategies for conducting SoTL.	**6 Adoption of the outcomes** adoption of the outcomes internally (within the institution) or externally to improve assessment, curriculum design in the same discipline or in other disciplines.
Stakeholder benefits		
7 Mutual stakeholder understanding understanding among students, tutors, learning designers, IT support; for example, their skills, challenges, requirements; a community that SoTL creates and moving outside traditional silos.	**8 Personal and professional development of project team and associated stakeholders** improved practice or personal knowledge; developing an analytical mind-set; collaborative or team-working skills; reflective skills; becoming a mentor to others; becoming a champion for SoTL; continuity in SoTL activity by individual educators.	**9 Recognition of project team members and other stakeholders** career trajectory that can be attributed to SoTL such as promotions; fellowships or memberships of professional associations nationally and internationally; invited speaker to events/conferences internally and externally; public recognition through awards, publications, conference presentations; leadership roles related to teaching and membership of strategic committees; external examiner and membership of external bodies.
4 Discipline-based	**5 Dissemination of**	**6 Adoption of the**

149 The Open University's (OU's) Research repository, Open Research Online (ORO), http://oro.open.ac.uk

Cultural and economic benefits		
10 Fostering of SoTL culture stimulating interest in SoTL; inspiring others to conduct SoTL; increased involvement of students in SoTL projects; a stronger overall faculty that values teaching and student learning; renewing/raising faculty excitement about teaching and making them more aware of how they teach; a move towards staff-student collaboration in curriculum design, development and evaluation; recognition of SoTL at par with disciplinary research.	**11 Financial implications** opportunities for income diversification; effect on costs of modules or programmes.	**12 Funding opportunities** internal (within the institution) funding for follow-on/new projects based on SoTL project's success; external funding (from outside the institution) for follow-on/new projects based on SoTL project's success.

The impact evaluation framework for SoTL is shared under Creative Commons licence: Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0, https://creativecommons.org/licenses/by-nc-sa/4.0/)

Appendix 2: Ethical considerations: Impact evaluation initiative

The participant information sheet and the consent form were sent to the project team/leads of each SoTL project in the impact evaluation initiative.

Participant information sheet

Impact evaluation of Scholarship of Teaching and Learning projects in eSTEeM

17 July 2022

Project

Impact evaluation of Scholarship of Teaching and Learning in eSTEeM

Researcher

The research will be conducted by Shailey Minocha (shailey.minocha@open.ac.uk)

Invitation

You are being invited to take part in an impact evaluation project of eSTEeM. This project will investigate impact[150] of eSTEeM projects over the last three to five years.

You have been chosen to participate as you have completed a scholarship of teaching and learning (SoTL) project funded by eSTEeM.

General information about the research project and collected research data

This research project will involve analysing 10-14 eSTEeM's SoTL projects to investigate the impact SoTL is having on the student success priorities of the university and Faculty of STEM but to also collate good practice of designing and running SoTL projects. The aim is to determine how eSTEeM is making a difference and what more could be done to support colleagues aspiring to conduct SoTL in STEM, and to collect best practice guidelines for conducting SoTL projects for impact.

Our aim is not to evaluate you as an academic or researcher but to collate best practice across a range of projects funded by eSTEeM to derive recommendations on how SoTL can make a difference to academic practice, student success, and to curriculum design.

What will I be asked to do if I agree to take part?

- Your participation is **entirely voluntary**. It is up to you to decide whether to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part, you are still free to withdraw at any time and until the 20-August-2022 and without giving a reason.

- Your participation will help enhance visibility of your SoTL activities in the university, nationally and internationally, but also enable other colleagues to learn from your experiences of SoTL.

- You will complete the impact evaluation by using an online impact evaluation toolkit over a couple of weeks.

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150 Scholarship of Teaching and Learning (**SoTL**) demonstrates a continual commitment to improving academic practice that is commensurate with teaching excellence. **Impact of SoTL** is defined as the effect or influence of a SoTL project or initiative on student experience, on the educator as a practitioner, and on the project team.

- Your eSTEeM project report will be analysed for impact by the principal investigator (Shailey Minocha) of this project.

- You will participate in email interviews for clarifications/elaboration of impact self-evaluations and your eSTEeM project report. Note that email interviews won't be conducted with all the eSTEeM project leaders who choose to participate. They will only be conducted if there is a need for clarification and elaboration from the self-evaluation of impact and/or the project report(s).

- There will be inclusion of excerpts of interviews, your self-evaluations of impact and eSTEeM project report in the final report of this impact evaluation project.

- Shailey will validate the impact account of your project with you after the data has been analysed and interpreted.

How will the data I provide be used?

- The data collected will be stored in a shared space on the OU's OneDrive which Shailey will have access to.

- Excerpts from your eSTEeM project report, your accounts on self-evaluation, and email interviews will be attributed to you and to your project in the final report of this project. Your data will not be anonymous and confidential for the purposes of this project and the report.

- The signed consent forms and email addresses will be stored until 31 January 2023 after which they will be deleted.

Output of the projects

A report will consolidate the impact with examples of individual projects as case studies along with some reflections on the overall impact of eSTEeM and lessons of good practice for impact including strategies for generating impact.

Expected outcomes of the project

The expected outcomes of the project are:

- provide evidence on the impact of eSTEeM projects

- identify outputs that have influenced or can influence change in policies and programmes at university level for university-wide impact on Learning and Teaching

- provide data on teaching excellence for TEF's narrative

- provide materials for impact case studies

- justify the investment in eSTEeM and in Scholarship of Teaching and Learning (SoTL) by the university: how a dedicated centre for SoTL has helped to establish a community of SoTL practitioners?

- raise the profile of eSTEeM in the university and outside

- inform the development of Faculty's Scholarship Plan and Scholarship Plans of individual Schools.

Your right to withdraw from the project

You have the right to withdraw from the project at any time during your participation by emailing to shailey.minocha@open.ac.uk and until 20-August-2022.

You have the right to ask for your data to be removed after your participation in the project by emailing to shailey.minocha@open.ac.uk and until 20-August-2022. After this date, it will be difficult to separate your data from the amalgamated data of this project in the draft report. It will also be difficult to get other colleagues on board and in time for the completion of this project.

For further queries

If you have any queries about the project, please contact Shailey. If you would like to contact anybody else, the eSTEeM Project Manager, Diane Ford (diane.ford@open.ac.uk) will be happy to address your concerns.

How do I agree to take part?

Please complete the consent form, sign, and return the consent form by emailing to shailey.minocha@open.ac.uk

Thank you

Thank you for taking time to read the information sheet.

Consent form

Impact evaluation of Scholarship of Teaching and Learning projects in eSTEeM

*Please **tick** the appropriate boxes*

Taking part in the project

Yes   No

I have read and understood the project information dated 17-July-2022 or it has been read to me. I have been able to ask questions about the project and my questions have been answered to my satisfaction.   ☐   ☐

I consent voluntarily to be a participant in this project and understand that I can refuse to answer questions and I can withdraw from the project at any time up until 20-August-2022 without having to give a reason.   ☐   ☐

I understand that taking part in the project involves: ☐   ☐

a) self-evaluation of impact

b) email interviews for clarification and elaboration

c) usage of my eSTEeM project report for analysis

and

d) inclusion of excerpts of interviews and my eSTEeM project's resources.

Use of the information in the project

I understand that information I provide will be used *for the final report on 'Impact evaluation of Scholarship of Teaching and Learning (SoTL)'.*

I understand that my association with the project and excepts from my eSTEeM project report will be shared in the final report of this impact evaluation project.

I understand that my data will be stored on the OU's OneDrive and in a secure folder until end of January 2023 after which it will be anonymised and moved to eSTEeM's data centre as described in section 3 below.

I agree that information of my eSTEeM project can be quoted in the report of this project.

I agree that my real name will be used for quotes in the report of this project.

Future use and reuse of the information by others

I give permission for the data that I provide to be deposited in a specialist data centre of eSTEeM on the OU's servers after it has been anonymised and after January 2023, so it can be used for future research and learning. This data will relate to anonymised transcripts of email interviews. Note that the individual eSTEeM project reports are already in the public domain and can be accessed from eSTEeM's website.

Signatures

_____   _____   _____

Name of participant   Signature   Date

I confirm that the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

SHAILEY MINOCHA_____   _____   _____

Name of researcher   Signature   Date

This project has been reviewed by, and received a favourable opinion, from the OU Human Research Ethics Committee (https://www.open.ac.uk/research/governance/ethics) - HREC reference number: **HREC/3375/Minocha**

Appendix 3: Self-evaluation of impact

For the impact evaluation initiative that led to the case studies included in the compendium, the Impact Evaluation Framework (IEF) for SoTL included in **Appendix 1** provided a common or a consistent structure or framework to conduct 'retrospective' impact evaluations. The IEF was adapted as a question-driven form to guide self-evaluation of impact by the SoTL project teams.

Along with the (generic) IEF-based questions in **part 2** of the self-evaluation form, the impact evaluator included a few project-specific questions in **part 1** of the form to trigger reflections and to enquire about the impact since the end-of-project report and any other dissemination materials that were written up by the project team.

The last two questions in the self-evaluation form pertain to reflecting on:

- Whether the SoTL project led to any unintended impact (different from what the project team had anticipated)?

- How the IEF (that is, the 12 facets and their attributes) may have hindered or supported the impact evaluation of the SoTL activity?

In **this Appendix**, the self-evaluation form that was sent to project team/lead(s) is included. The project team/leads returned the self-evaluation form(s) with their inputs to the impact evaluator.

Evaluating for impact of a Scholarship of Teaching and Learning (SoTL) project

Your project

<Title of the project and URL>

Terminology

Impact of a SoTL project: The impact of a SoTL project implies demonstrable benefits that are directly attributable to that project. Impact of SoTL activity is usually judged against two aspects, *significance* and *reach*. These imply: how significant are the benefits of the SoTL project and for whom? And how far-reaching are the outcomes of the SoTL project?

Evaluation for impact: Evaluation of a SoTL project for impact will involve finding out who has benefited from SoTL and how, and to collect evidence related to significance and reach.

Evaluating your SoTL project for impact

There are **two parts** of this evaluation activity.

Part 1: Questions to aid reflection

Please write your thoughts against each of these questions. Thank you.

a) Have you been able to disseminate the outcomes of your project since the completion of your project? If yes, what has been the result of the dissemination activities in terms of impact generation?

b) Based on the project's outcomes, have you had an opportunity thus far to influence uptake of <outputs of the project> within the faculty and elsewhere in the university?

c) How would you explain the impact of your project to a colleague to encourage them to adopt an initiative same/similar to yours in their academic practice?

d) Could you kindly reflect on what educators in other institutions nationally and internationally can learn from your project?

Part 2: Using the facets of the impact evaluation framework

Based on a decade's experience of SoTL practice in eSTEeM, we have developed an impact evaluation framework (IEF)[151] consisting of 12 facets or criteria for SoTL's impact which we are suggesting that you use to self-evaluate your project.

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151 'Evaluating for impact' *in* 'Scholarship of Teaching and Learning in STEM, Badged Open Course (BOC), The Open University, https://www.open.edu/openlearn/mod/oucontent/view.php?id=109326&section=2.3

The **12 impact facets** are as follows. Each facet or criterion is written in the form of a *probe/question* along with some related attributes to aid your reflection/evaluation.

Please include your thoughts and experiences against only those facets/criteria that are applicable for your project, and please provide evidence wherever possible. Thank you.

1. *What has been the impact on student experience?* pre-registration; induction; curriculum design; design of assessment; learning design; student engagement with course content; student engagement with the technological intervention; and student satisfaction rate.

2. *What has been the impact on student retention and progression?* student registrations; average marks as compared with previous year(s); module completion rate; module pass rate; student retention rate; and student progression.

3. *Is there evidence of excellence in teaching?* student skills-set (e.g. academic writing; critical thinking; reflection; problem-solving; group-working; digital literacy); student employability; evidence of research-informed teaching; data for assessments (e.g. UK's TEF), programme reviews and accreditation processes; inter-disciplinary collaborations in teaching; accreditation against professional standards; informing policy development internally at the level of department, faculty or University; and informing policy development externally (in another institution or in the sector).

4. *Has there been an influence on discipline-based teaching, research and practice?* change in the ways in which subject concepts are taught; interest/confidence in discipline-based research; inter-disciplinary collaborations in research; uptake of outputs in industry practice.

5. *Have you disseminated the project's outcomes?* number of publications from the project/initiative and impact factor of individual journals/conferences; publications with students as co-authors; Google Scholar analytics or other institutional analytics (e.g. OU's ORO[152]) on downloads of reports/publications; and sharing of novel research methods/strategies for conducting SoTL.

6. *Have the outcomes of the project been adopted by other educators?* adoption of the outcomes internally (within the institution) or externally to improve assessment, curriculum design in the same discipline or in other disciplines.

7. *Has the project enhanced mutual stakeholder understanding?* understanding among students, tutors, learning designers, IT support; for example, their skills, challenges, requirements; a community that SoTL creates and moving outside traditional silos.

8. *Has the project facilitated the personal and professional development of project team and associated stakeholders?* improved practice or personal knowledge; developing an analytical mind-set; collaborative or team-working skills; reflective skills; becoming a mentor to others; becoming a champion for SoTL; continuity in SoTL activity by individual educators

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152 The Open University's (OU's) Research repository, Open Research Online (ORO), http://oro.open.ac.uk

9. Has the project led to the recognition of project team members and other stakeholders? career trajectory that can be attributed to SoTL such as promotions; fellowships or memberships of professional associations nationally and internationally (e.g. Advance HE fellowships); invited speaker to events/conferences internally and externally; public recognition through publications, conference presentations; leadership roles related to teaching and membership of strategic committees; external examiner and membership of external bodies; public recognition through awards.

10. Has the project helped to foster SoTL culture? stimulating interest in SoTL; inspiring others to conduct SoTL; increased involvement of students in SoTL projects; a stronger overall faculty that values teaching and student learning; renewing/raising faculty excitement about teaching and making them more aware of how they teach; a move towards staff-student collaboration in curriculum design, development, and evaluation; recognition of SoTL at par with disciplinary research.

11. Has the project had any financial implications? opportunities for income diversification; effect on costs of modules or programmes.

12. Has the project led to funding opportunities? internal (within the institution) funding for follow-on/new projects based on SoTL project's success; external funding (from outside the institution) for follow-on/new projects based on SoTL project's success.

Reflections

Unintended impact: Has the project led to any unintended impact (different from what you had anticipated) of your SoTL activity?

Impact evaluation framework: Any thoughts and reflections on how IEF (that is, the 12 facets and their attributes) may have hindered or supported the impact evaluation of your SoTL activity?