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Does Research-Informed Teaching transform academic practice? Revealing an *RIT mindset* through an impact analysis

Abstract

Integration of research into teaching is a major area of interest in the field of higher education. Considerable work has been done on how staff and students view this integration, how it can be achieved in practice, and how it might best be researched by scholars. However, relatively little research has considered how Research Informed Teaching (RIT) impacts teachers' own practice, in multi-disciplinary contexts. We interviewed a purposive sample of twenty research-active teachers from a range of disciplines, at an English University. Using the UK Professional Standards Framework (UKPSF), we mapped our findings of a thematic analysis, concluding that RIT impacts academic practice in a range of distinct and complex ways. Because of RIT, lecture design, delivery, assessments and student support activities have become more inquiry-focused; study spaces have turned into collaborative learning contexts, and classroom communications, more comprehensible. For lecturers, RIT has helped create a professional identity and a closer engagement with continuous professional development. Based on our analysis, we argue that what makes these impacts possible was a set of characteristics - termed here as a *RIT mindset*, that drives academics to voluntarily engage in pragmatic research-teaching integrations to liberate students into real learning. We offer evidence for RIT impact and make visible how and why RIT impacts academic practice. We provide a caution that RIT happens only by design, and to make that design a reality, developing the *RIT mindset* may be critical.

Key words

Research Informed Teaching, Academic practice, Teaching Impact, Teaching-Informed Research

Introduction

The purpose of this study is to understand the impact of Research Informed Teaching (RIT) on lecturers' teaching practice in a wide range of disciplinary traditions. The importance of integrating research into teaching for the benefit of students, and for the good of societies, has been widely recognised (Stern, 2016; Brew, 2012). Growing evidence indicates that engaging students in inquiry-based learning, as opposed to content-centred teaching, has more beneficial outcomes for students, such as the development of critical judgement, self-belief, independence of thought and initiative (Elken & Wollscheid 2016). It is not surprising then that most universities aspire to integrate research into teaching in everything they do. Despite the increasing institutional interest, and the extensive theoretical and empirical attempts that examine the practice of RIT, Robertson (2007) argues that "there is a need to move beyond generalised assumptions and institutional rhetoric to a deeper understanding of how academics think about and enact a relation between their research and their teaching" (p. 541) and that we need to "do more to explore in detail what actually happens in practice" (Tight, 2016, p. 293)

We focus on addressing these learning needs in this small-scale qualitative study by examining the views of academics who claim to have actively linked research and teaching in classrooms. In particular, we investigate how they 'think and enact' the relation between research and teaching, and explore in detail how their actual practice is impacted by the integration. In so doing, we seek to understand what characteristics make them engage in RIT practice, so that academic development practices in Universities could be further enhanced. Specifically, our research question is, *how do research-active academics perceive the impact of RIT, if anything, on their teaching practice?*

We understand *research* as 'systematic enquiry made public' (Stenhouse, 1981, p. 104). We define *impact*, in line with the Economic and Social Research Council (ESRC) - the leading research funding body in the UK, as a demonstrable contribution that RIT practice makes to individual lecturers, teaching teams, institutions and communities. This impact can be *instrumental* (e.g. influencing an individual's teaching practice or help the shaping of a policy at departmental or institutional level), *conceptual* (e.g. contributing to an understanding of university teaching or reframing the conversations within and among lecturers) or *capacity building* (e.g. contributing to personal and professional development) (ESRC, 2017). The term 'teaching practice' is understood in terms of the five areas of activities (see Figure 1) included in the UKPSF – "a widely agreed benchmark" which articulates the core activities of teaching (Joseph-Richard et al. 2018, p. 386), and specifies 'a comprehensive set of professional standards and guidelines' that would apply to all staff who teach in higher education institutions in the UK (UKPSF, 2011).

(FIGURE 1 HERE)

This paper is structured as follows: In the first section, we reflect on the trends in RIT conceptualisation and critically review the current frameworks found in the extant literature. We conclude the section by highlighting seven different ways of conceptualising RIT. Next, we present our methodology and findings to shed light on how RIT actually enhances academics' teaching practices. We make the following contributions in this paper: we make visible how RIT impacts teaching practice, in distinct and complex ways; we also reveal how academics demonstrate a specific set of characteristics, termed here as *a RIT mind-set*, that drives them to voluntarily engage in pragmatic research-teaching integrations to achieve desired outcomes for students, teams and systems. We argue that lecturers must link research and teaching in more innovative ways that change their practice for the better, including their active engagement in teaching-based and teaching-led research, with a specific RIT mindset.

Theoretical context

Scholarly interest in understanding what constitutes the classic Humboldtian notion of the unity of teaching and research in universities is growing in higher education literature (Malcolm, 2014). For Humboldt, the university is the place in which teaching and research are inseparable; it is where both teachers and students, as a community of learners, are engaged in the pursuit of knowledge through collective inquiry (Collini, 2012). In essence, inquiry is seen as the unifying link between what lecturers do as researchers, and what students do as learners, and thus newer possibilities of linking teaching and research are thought to be possible in HEIs.

Although the Humboldtian notion of universities has been influential over the decades in shaping institutional thinking (Robertson & Bond, 2005), in reality, however, such unified experiences are not part of staff-student experiences in most modern universities. Not all teachers and students, either independently or in partnership with the other, engage in active, critical, analytical enquiry. Variations in individual and institutional characteristics, along with the tensions triggered by changes connected to increasing emphasis on managerialism, efficiency, outputs, impact and increasing students' expectations, prevent their full engagement in research, teaching and civic engagement (Brown & Carrasso, 2013). In addition, teaching and research occur in different places, for different purposes, and are funded from separate sources; both vie for the ever-depleting time and resources (Stappenbelt, 2013), require different set of skills, have different impact trajectories and are measured by different criteria of excellence (Perkins, 2019). Furthermore, the conceptual murkiness of the key terms 'research' and 'teaching' (also 'RIT') (Verburgh et al. 2007) also makes the development of a stronger research-teaching relationship across curricula further challenging. Meta-analytical studies could only conclude that 'at best, research and teaching are very loosely coupled' (Hattie & Marsh, 1996, p. 529) and both could be viewed as complementary, in spite of the absence of a systematic relationship between them, across institutions (Braxton, 1996).

Despite these challenges, a symbiotic relationship between the two has been theorised in the literature (Rowland, 1996). Possible reasons for assuming a mutual relationship between the two include that the competencies needed for successful teaching and research are arguably similar (Hattie & Marsh, 1996) and it is the process of learning that underpins both (Brew & Boud, 1995; Boshier & Huang, 2008). For some, research and teaching, at times, "have become indistinguishable" (Vroom, 2007, p. 372) as both of them complement each other in practice. We also found that a specific mind-set of teachers, as will be discussed at the end of the paper, makes the integration of the two possible, in classroom settings. Indeed, there is some empirical evidence to confirm this synergy. Coate, Barnett & Williams (2001), and Robertson & Bond (2001), based on their small-scale qualitative studies concluded that there is a relationship between the two, and that relationship is complex and multi-directional in nature. They established that the relationships could be either positive, negative or neutral. Taken together, these studies, among others, present a richer picture of the nexus, whilst highlighting agency of a teacher and the role of local contexts in creating subtle distinctions within the relationship. The literature makes it clear that the integration cannot happen automatically and a strategic intent, scholarly commitment, policy-driven initiatives, resource allocations, access to research results, and a facilitative context are required to 'locally nurture' the research-teaching relationships (Tight, 2016, p. 293).

In later years, scholars re-directed their attention to categorising the practice variations recognised in the literature. We will briefly consider the various conceptualisations of RIT found in the literature. An oft-cited and widely applied conceptual framework by Healey (2005, drawing on Griffiths, 2004), on how research and teaching can interrelate in the teaching undergraduate curriculum, has been published over a decade ago. According to this framework,

the links between research and teaching may be developed in four different ways; they are mapped on a two by two matrix, representing emphases on research content and process on the opposite poles of a horizontal axis, and students as *participants* and *passive consumers* on the ends of a vertical axis. These links include developing a teaching strategy that is 'research-led' (where teaching evidence-based 'subject content' dominate the curriculum), 'research-oriented' (where staff seek to develop the students' ability to do research), 'research-tutored' (a curriculum focused on students' writing, learning about research findings, and evaluating others' research) or 'research-based' (the curriculum becomes inquiry-based). Using students as units of analysis, Healey (ibid) demonstrated how research and teaching can be integrated into undergraduate teaching, in pedagogically useful ways. This framework has inspired several other frameworks (Ozay, 2012; Visser-wijnveen et al. 2016) that either amend or append the original categorisations.

While Healey's imaginative efforts resulted in a seemingly comprehensive and visually interesting framework, it might give an impression that the complexities we encounter in our on-going practice, can be neatly captured in a two by two matrix. Inevitably, this static a-temporal, a-contextual framework, despite its usefulness, conceals the complex nature of both research and teaching, and masks the individual, departmental, institutional and national differences generally found in undertaking research and teaching in specific educational contexts – factors that are duly acknowledged by the authors in their later publications (Healey, Jenkins & Zetter, 2007). Furthermore, both the direction and strength of the research-teaching links, as specified in the framework, appear to overlook a number of related factors, such as the degree of academic orientation of the programme within specific disciplines, researcher productivity, the student population under study, their cultural differences, research skills, and learning preferences (Brew et al. 2016). Similarly, the asymmetrical power relations between teachers and students, their cultural exchange, and the possible tensions between student agency and control, participation and observation, and research contents and processes, are also invisible in this framework (Schroeder, 2007), although the axes hint at them (Joseph-Richard & Jessop, 2018). It is to be recognised that Healey's framework, and most other RIT frameworks, cannot mirror the reality, as they are conceptual products of experts, with little explicit emphasis on the teachers' own perspectives and experiences. They, however, provide useful starting points and act as guides to further theorisation and action, while highlighting the challenges in capturing the complexity of the research-teaching nexus.

Few others have argued that in the current RIT conceptualisations, there is an assumed unidirectional causality and it is the 'research' – however defined – that always informs 'teaching', thus ignoring any possibility of reverse causality (Harland, 2016; Willcoxson et al 2011). Indeed, teaching can also inform and inspire systematic inquiries in many ways. For example, Charles (2018) argues that, in addition to doing classroom-based research (that takes pedagogy as the object of systematic inquiries), there are also possibilities for conducting *teaching-informed research* (where an inquiry is triggered by the interactions that happen while teaching a subject) and *teaching-led research* (that potentially change the character of an inquiry, for example, by changing a research approach, design and methods). Collectively, these scholars encourage researchers to acknowledge the two-way relationship that facilitate the mutual influence of research and teaching in HE contexts. Most recently, Joseph-Richard & Jessop (2018) empirically identified a new RIT category, termed as *'impact-informed teaching'*, which refers to the practice of using *research impact* as a starting point of classroom instructions. Similar to Boyer's (1990) *Scholarship of Application*, in their 'impact-inspired' conception of RIT, real-world applications of research evidence form the content of teaching, and students are motivated to learn the 'use-value' of research so that their analytic inquiries make a difference to their worlds. These categorisations (summarised in Table S1) are

important in enhancing our understanding of the complex connections between research and teaching. The variety of terms used here for RIT also indicates the complexity of this practice and the difficulty of describing and researching it.

Despite being 'useful organising devices' (Malcolm, 2014), much of the prior frameworks and conceptual works on research-teaching integration, tends to remain focused on how staff and students view this integration, how it can be achieved in practice, and how it might best be researched by scholars (Tight, 2016). Relatively less emphasis was given to an analysis of the possible effects of RIT on students and teachers. Scholars began to investigate how the impacts of RIT is experienced by students. Healey et al. (2010) found that the undergraduates sampled in their study experienced the non-availability of staff who buy-out their teaching to undertake research commitments – a negative impact of RIT, confirmed also by others (Smith & Smith, 2012; Bak, 2015). In similar vein, Duff & Marriott (2012; 2017), in their multi-method exploratory studies of the British Accounting academics found a range of less desirable impacts of RIT, among others, for students: that research-active Accounting lecturers are pitching the level of their classes too high, that they have relatively limited time for student support, that they teach an imbalanced curriculum by overemphasising the contents aligned with personal research interests, and that they engage relatively more in research activities because of the lack of rewards and recognition for undertaking teaching-only activities, among others. These studies are useful in enhancing our understanding of the impact of RIT in institutions. However, these are based on perceptions of students or that of academics chosen from a single field such as accounting. A fuller understanding of how teaching activities, such as designing and delivering lectures, setting assessment tasks, and creating learning environments, among others, are impacted by RIT practice within a range of disciplinary traditions could enable us to create more meaningful research-teaching integrations. Our study addresses this issue, by capturing research-active teachers' perspectives on how RIT impacts their practice, in a multi-disciplinary context.

Methodology

In this interpretative qualitative study, we explored academics' perceptions of RIT's impact on teaching practice. We were also interested in identifying the characteristics that are common to them. The university, in which the study is conducted, is a ten-year old, small, post-1992, teaching-focused institution, in Southern England. An aspiration to provide *Real-world Learning,* through strong links to industry, the professions and local businesses, distinguishes this university from others in the region. However, with the arrival of the UK's Research Excellence Framework (REF) and Teaching Excellence Framework (TEF), the university had to reboot its mission and values. As a consequence, the University Strategy (2015–2020) committed newer resources for linking research and teaching in curriculum design and pedagogy. It created a Learning and Teaching Institute to actively promote *RIT* as the preferred method of delivering real-world learning. It appointed the UK's first Professor of RIT, implemented a RIT policy, which was broadly aligned with Healey's (2005) framework, discussed earlier. Four *Research Hubs* were established to promote cross-disciplinary networks and inter-departmental collaborations, across the university. All departments began to work towards creating stronger research-teaching links in their course provision, particularly through the review of all courses, that is in line with a newly created curriculum framework, which prioritised inquiry-based learning. There is some evidence to suggest that academics who work in such post-1992 teaching-intensive universities in England, are faced with increases in student numbers, heavy workloads, increasing administration, poor management, difficulties in obtaining research funding, and growing insecurity of academic posts (Darabi, Macaskill &

Reidy, 2017). This typical teaching-focused institutional context provided us with an opportunity to explore research-active teachers' impact experiences on RIT.

On obtaining the necessary ethics permission for the study, we identified academics, designated as 'research-active' (n=36), in registers maintained in the *Research Hubs*. We created an online checklist, using *Google Forms* to capture the most up-to-date research activities of these academics. Based on Jungnickel and Creswell's (1994) views on scholarly performance, we asked them to identify their involvement in a range of research activities (e.g. enrolment in/completion of PhD, engagement in doctoral supervision, examining PhDs, undertaking/leading researcher development, success in securing research funds, and experience of reviewing research papers, designing and leading research studies, and disseminating findings in appropriate outlets). All 36 academics completed the confidential checklist. Based on a review of their responses, we purposively selected a stratified sample (Suri, 2011) of twenty research-active teachers, representing the maximum variation in terms of their gender (M=45%, F=55%), teaching experience (Range 6-32 years), job roles (Professors=4, Senior Lecturers=8, Lecturers=8), research outputs (Range 2-34), doctoral supervision completions=35%,ongoing doctoral supervisions=70%, engagement in doctoral examinations=40%, engagement in doctoral researchers' development=50%, experience of reviewing=75%, leading research projects=35%, engaged in research dissemination=80%. (See Table S2).

We piloted the questions with the two most senior research active academics, who were leading the research hubs. Enriched by the learning from our pilot study, we finalised our interview schedule. These open ended questions helped us collect the required data: "When you hear the construct RIT, what comes to your mind?" "If you integrate research and teaching in your classes, please give us some examples" "What impact, if any, does this integration have on your practice?" During the semi-structured interviews, all participants described 'how' and 'why' they engaged in research and teaching integrations. We worked in pairs when conducting the interviews, and the conversations lasted for approximately 45 minutes each. The interviews were recorded and were transcribed verbatim. Following the data analytical guidelines given in Miles, Huberman & Saldana (2019) and Clarke and Braun (2013), we thematically analysed the data. When familiarising the data, we stepped outside of narratives to ask what kind of RIT conceptualisation is used, under what circumstances they practice RIT, and how the perceived impact has been articulated. For data condensation, we started using provisional coding as we read the transcripts. To achieve high coding reliability, we used two major stages: in the first stage, in cycle 1, the first two authors descriptively coded five, randomly selected, transcripts each using an iterative approach. With a view to reduce the risk of coder bias, they exchanged and re-coded the transcripts coded by the other. Both the authors produced an abbreviated codebook, based on the descriptive codes of the ten transcripts. In cycle 2, using the codebook, the third and the fourth authors coded the remaining ten transcripts. In the second stage, we verified all the codes and sub-codes collectively as a group, and generated categories by constantly comparing them across the transcripts. Based on meanings, patterns and relationships found among the categories, we then developed themes and labelled them using the five 'areas of activities' specified in the UKPSF. We finalised our preliminary *discoveries* as a group through argumentation. We then selected key texts for display and used those quotes, along with pseudonyms, and presented them next.

Findings

RIT has influenced teachers' practice in distinct and complex ways. In this section, we organise our findings into five logical categories of teaching activities found in the UKPSF, and present data excerpts that support our interpretations and analysis.

A1: Design and plan learning activities

RIT makes 'designing and planning' tasks into 'research-led' activities, but it takes time

RIT has a direct impact on the design of the curriculum. RIT is the way lecturers bring their specialism into the curriculum. RIT tends to be the guiding principle for some lecturers as they write new modules based on their own research and publications.

> *"Yes, given that mostly we are teaching contents that are based on empirical research, a lot of design and delivery is about how to make them accessible to students, and show how the latest research informs that area"* (Gemma).

For another, it is important for lecture content to be updated regularly to reflect the latest changes in their discipline:

> *"…in my subject area [of criminology…it has to be updated because the trends are all different and new things are constantly happening (*Elango).*"*

Although it is clear that the designing of lectures has been influenced by RIT, integrating research in the curriculum takes time, and this barrier was identified by many.

> *"It all takes time. When doing RIT, you cannot just lift the file and deliver the stuff"* (Jingsu)

It is important to recognise that the above participants, while explaining how RIT influences lecture design, view RIT, predominantly, in terms of Research-led teaching (i.e. where the focus is on learning about research findings).

A2: Teach and/or support learning

RIT transforms the 'delivery' of lectures into a 'research-oriented' and a 'research-tutored' process, but it requires a research culture for its maintenance

RIT makes the 'delivery of lectures' a face-to-face, teacher-centric process, in which research methods are taught ('research-oriented'), and published research is critiqued in the teachers' presence ('research-tutored').

> *"…One formative task that I set them is a debate… I highlight a few key sources and texts; then they have a week to research their subject and build an argument. We get together the following week for a structured debate that I chair. I put them in two groups and ask them to present their research and findings, so each side gets to offer their opinion on a given topic, then we open it up for discussion"* (Darrah)

Another lecturer stated that in Psychology, she and her colleagues often try to make research 'come alive' by asking their students to enact social experiments and discuss the outcomes of research. Few others tend to adopt a problem-based learning approach that encourages students to do their own research and critique the findings:

> *"They're told to go away and read around a problem and I direct them where to start. I don't give instructions on how to go about doing research. They come in next week*

with a research protocol; we talk through the protocols to make sure there is nothing wrong. Then I send them away to collect data using that protocol. When they come back for the tutorials, we look at the data. We critique every bit of their work" (Joy).

Another lecturer mentions that she invites other colleagues to teach in some of the areas where she has not done research herself, and she identifies the need for a research culture and institutional support that facilitate such collaborative teaching:

"In planning a unit, there are some topics that I may not have done research. So I get someone else to come to do the session. The problem with this is that I should have colleagues who work on cutting-edge topics, and they should have time, space and [a] heart to help me out" (Judith).

RIT sparks new research questions and makes classroom communication more comprehensible and transparent.

When describing RIT's impact on delivery of lectures, the reverse relationship (i.e. teaching influences research) was also noted by some. By stimulating new research questions, classroom teaching creates excitement and energy around further research. Some have started researching new topics, because they have been asked to teach a topic, and RIT has modified how they approach research projects and academic writing:

"Talking to students sparks off new ideas and so on. From that point of view, 'yes' my teaching influences my research" (Noel).

"I often take things into the classroom that I haven't fully solidified. I want to test the water with and see how they work together." (Don).

RIT makes classroom communications transparent and easy to understand:

"As a researcher, I use plain English, in a simplified style, when communicating my research to my students" (Grace).

A3: Assess and give feedback to learners

RIT converts assessment practices into 'research-oriented' activities, but their effectiveness depends on student engagement

RIT enhances assessment designs, as lecturers embed the research process and critical thinking skills in the assessment criteria. Assessments have become opportunities for ensuring that students' works are evidence-based:

"I tell students this: if you're making a claim, you have to show evidence to support that. You cannot make absolute statements. (Joy)

Integrating research evidence, gradually, to a varying degree in exams, but in a differentiated way is explained by another:

"The exam is designed in such a way that there is a lot of choice… there are 'more complicated bits' that some students can avoid, but [those] who are interested can do, and some 'less complex bits' that everyone could do. I upload my own papers on specific topics, indicating clearly their quality, difficulty-levels. I can differentiate students' achievement, based on the readings they use in their answers". (Neil)

Several lecturers designed assignments in ways that the topics are aligned both with the needs of businesses and with their own research interests.

> *"I pick four or five organisational problems that are aligned with my personal research interest, for their assessment. I ask students to identify a topic from that list for their research project. They review the literature, design the study, collect data and submit the dissertation as their final year project"* (Frank)

However, it was highlighted that not all students develop their research skills through these research-skills focused capstone projects:

> *"… a lot of our students are really not concerned with anything other than just getting by and getting their degrees, and hopefully getting a job and enjoying themselves. They're not very keen to develop their research skills. They're not very questioning by nature; Many of them, particularly international students, have been through an education system, which has said, 'Copy the answer from the board.' Some other students, who are interested, get a great deal out of it…"* (Neil).

Neil's experience, while bringing out some of the consequences of the aggressive internationalisation of higher education, foregrounds the absence of 'pedagogical capital' in some students. Pedagogical capital is defined as "a quality that some students possess that enables them to arrive at the academic table better positioned to take advantage of our educational offerings" (Livingstone, 2007, p. 1). Neil argued elaborately during the interview that having students with low pedagogical capital, and with varying levels of prior knowledge and study habits in a RIT classroom, will not automatically reap RIT's benefits, as it is commonly assumed in many prior studies, simply because a lecturer has chosen to integrate research and teaching. Finally, it can be noted that these interviewees, in relation to 'delivery' of lectures, conceptualise RIT as 'research-oriented' (i.e. teaching 'research methods').

A4: Develop effective learning environments and approaches to student support

RIT encourages academics to develop collaborative learning spaces and it makes their support activities 'research-based'

RIT enables lecturers to develop effective learning environments that foster opportunities to collaborate with students in undertaking systematic inquiries and projects of social importance:

> *"I meet students who show genuine interest in doing research, in our Research Hub [a flexible, technology-rich social space] very often. We have a cup of coffee, exchange ideas, critique and review journal papers, and, sometimes, we draw up plans for future publications. My students have begun to see themselves as partners in research, and not as consumers of stuff I produce."* (Rita)

Lecturers' approaches to student support and guidance also have been changed positively because of RIT. Some reported that they adopted less of a didactic style of teaching. RIT has provided a scholarship-inspired student experience so that the learners become confident, critical and more engaged with their academic tutors. A lecturer, after handing over Greenhalgh's (2014) book, entitled *'How to Read a Paper: The Basics of Evidence-based Medicine',* to one of the interviewers, said,

> *"[*while pointing to the book*] This is what I ask my students to read in their first year. If they understand how to look at someone else's work, all you need to do is flip around… so you know how to do it yourself….. I'm very critical of my own early research and I told my students 'we did this, but it was wrong and now we're changing it. So please disregard our earlier work.' We're constantly teaching the students to be critical"* (Joy)

Some lecturers take students as partners in publishing, or as co-presenters of conference papers, and foreground the 'research-based' conception of RIT:

> *"It is 'learning by doing' .... the really good students gravitate towards me because they recognise the opportunity to do a really [good] project and, potentially, get involved. I have converted the best assessment submissions and published 5 to 6 papers already"* (Joy).

In the above experiences, RIT is conceptualised as 'research-based' where lecturers create a curiosity-driven ethos in classrooms, and students undertake research and inquiry to co-develop knowledge through joint-publishing, and, as a consequence, students have developed a close partnership with staff.

A5: Engage in CPD, incorporating research, scholarship and practice evaluation

RIT helps teachers evaluate their work and inspires them to be actively engaged in continuous professional development

Integrating research into teaching forces lecturers to be up-to-date with what is currently happening in their field of work, and a commitment to develop themselves both as researchers and teachers is foregrounded in these excerpts below:

> *"My students told me that they could not follow my argument in one of my papers. These days, when I write for publications, I always think if my students can get this"* (Kim).

At times, students' feedback on research enhances teachers' practice. Some interviewees' accounts foreground the *impact-inspired teaching* that is validated by students' feedback:

> *"We have a lot of feedback from students. It's great to hear back when students say at the end of the year [that] they found their learning useful, in terms of application in real world… which I think is very important for research, to not just look at questions and answers but also to feed into something that can be used in industry"* (Amal)

RIT creates lecturer's professional identity, if teaching and research interests happen to be aligned

The impact of RIT on developing lecturers' professional identity was reported to be profound. For some, RIT sustains their confidence and enthusiasm; it makes teaching more satisfying, as research informed teaching is synonymous with good HE teaching:

> *"[Research and Teaching] are so interrelated that I don't think I can be a good teacher unless I stay up-to-date with current thinking and ideas, and challenge popular concepts. It has had a huge impact upon me and what I do and the way I think of myself as an academic….It has given me a huge confidence about what I do as an academic"* (Darrah).

During the conversations, RIT was emphasised as a fundamental aspect of university practice:

> *"In RIT, you can talk about the real world in a more relevant way than the textbook and Teaching has to be a direct incorporation of research outputs into your teaching"* (Neil).

Similarly, it was stated that all HE teaching should be research informed:

> *"If you're in higher education then you shouldn't have to say RIT because it should all be RIT"* (Joy).

For these lecturers, university teaching is synonymous with RIT and this alignment gives them a sense of identity as a university lecturer. However, not all of them experience this alignment. For example, a lecturer who had been asked to teach subjects that are not aligned with his research interests, experienced RIT differently:

> *"I have published in this area and yet I'm not able to use those skills for the students' benefit because I am now teaching what I had been asked to teach and not the topics that I am researching on. In some cases, the cutting-edge topic I research is not part of the outdated curriculum I have been asked to deliver…. My modules are 'short and fat,' and there is simply no time to bring in the fruits of my research. So, it decreases my own engagement, and my own personal satisfaction from it"* (Elango).

By articulating the fact that not all researchers are teaching their own specialist areas of expertise, and shorter courses do not necessarily offer space to use benefits of teachers' research, the participant highlights additional complexities involved in the practice of RIT.

Researching own teaching practice? Limited evidence was found

When asked about whether the participants undertake research on their own teaching, most of them said that they had not. Although some, who studied a Post Graduate Certificate in Learning and Teaching course, have begun to consider doing pedagogic research, none of our participants said that they practice 'RIT as teaching-based'. Evidence for using insights generated by pedagogic research to enhance their teaching was also rare in the data.

To recap, the practice of RIT, in its various forms, have helped many of our academics change their practice for the better. It has seen to influence the UKPSF's five areas on teaching practice. We make an attempt to present visually the complex interconnections between these impact relationships (See Figure 2).

[INSERT FIGURE 2 HERE]

We acknowledge that the visualisation represents an over-simplified illustration of a complex, interconnected practices of RIT. The seven circles represent the different ways of the research-teaching integration found in this study (and summarised in Table S1). All circles are linked by dotted lines that represent that it is *learning* that links the different ways of doing RIT. This interconnecting link also signifies that the different RIT practices are related to each other, are dynamic, fluid and ongoing, and one way of practising RIT has the potential to influence the other, negatively or positively. The circles are placed on a pentagon-shaped mosaic, which represents the need for embedding these practices in a specific context and the base signifies the impact that has been experienced by our sample. At the core of the figure is an RIT mindset – a set of professional characteristics (explained in full below) - believed to be critical for an impactful RIT practice. The significance of this illustration is six-fold: (1) it reminds us to recognise that there are several ways of practising RIT; (2) it invites us to view that the different ways of doing RIT can co-exist in a given context; (3) it emphasises one way of practising RIT is not superior or inferior to any of the other forms; (4) it encourages us to acknowledge the RIT practice is dynamic, context-dependant, interconnected, and temporal; (4) it reminds us to think it is *learning* that connects the various ways of doing RIT; (5) it advocates adopting a holistic approach to RIT practice and research, and (6) it reveals the significance of RIT mindset (explained next) in nurturing the practice-based integrations used by lecturers. Next, we discuss the significance of the RIT mindset and discuss implications of our findings.

RIT mindset

At the end of our analysis, we as a group of researchers reflected on what else we found in this study. We realised that a striking similarity charaterised the sample. A specific set of 'identity markers' that seem to give them a common professional identity as RIT practitioners. We began to see that these markers act as key energy sources that help them make RIT possible. We call all these markers together as an 'RIT mindset', defined as a set of beliefs (that RIT can be developed through good strategies, experience, seeking help, collaboration, risk taking and commitment) and competencies that drive academics to voluntarily engage in pragmatic research-teaching integrations to achieve desired outcomes. These identity markers include: a belief in the integration of research into teaching, for the service of students, institutions and societies; a desire for excellence in teaching while nurturing a passion for undertaking systematic inquiries, a situated understanding of strong subject knowledge, high confidence in their teaching ability, a noticeable difference in not only *what* they teach but also *how* they teach, an openness to adopt a discovery-oriented inquiry-based learning approach (Spronken-Smith and Walker, 2010), a willingness to position themselves as a life-long learner and not as an expert, a commitment to teach that knowledge is provisional, the courage to explore why things work (or do not work), an ability to design and lead new analytic inquiries, a compulsion for connection and networking, the humility to submit their work to local and public review, and a disposition to co-produce knowledge with colleagues, students and other partners, and an intensity of commitment to research-informed practice (Cain et al. 2019, p. 6).

In essence, they are rounded practitioners, who pay mindful attention to new discoveries and insights. Their leadership and connections with students define them; they listen with fascination to students, research community and professional organisations. Their unhampered participation in a given classroom-context shape their thinking and reflection. They collect, sift, test and evaluate research-generated insights and collect what may be useful to students and to the topic of interest; they safely and effectively stretch the boundaries of teaching and research to help both these areas meet in a classroom for the sake of learners and learning; they are effective context-crafters, who design spaces that facilitate inquiries, and have a bias towards creating a situated sequence of actions that integrate research and teaching. They are not 'blinkered' by the current RIT conceptualisations found in the literature. Instead, they are imaginative in finding novel targets for integration. They view RIT as an everyday practice (of being a lecturer) that encourages experimentation, independent thought, refinements in judgement, and the development of problem-solving skills, so that these academics become more open to alternative viewpoints, newer pedagogical strategies, and curriculum change. As Magi and Beerkens (2016) demonstrated, an intrinsic interest in *both* research and teaching, was evident in them. As Kane, Sandretto & Heath (2004) pointed out, being reflective is central to their practice and that reflection informs their approach to RIT. As Wieser (2018) suggested, we found them 'dedicated to the transformation of the professional self (p.7), which enables them to broaden their sight to see beyond dichotomies, and address challenges they experienced in doing RIT. It is because of this mindset that many of the participants were able to make a difference to individuals and institutions, and to experience the transformative power of RIT in a given context. We have begun to believe that that this RIT mindset maybe important for making RIT a reality, at least in teaching-focused contexts.

Discussion

Herein, we have explored the perceived impact of Research Informed Teaching on lecturers' teaching practice. Data collected from a stratified sample of twenty research-active academics gave us evidence of RIT impact. In demonstrating how RIT positively changed lecturers'

teaching practice, our study makes an important contribution of revealing an RIT mindset that makes academics engage in impactful academic practice that create meaningful outcomes for students. In doing this, we take another step forward in explaining why RIT happens in practice. Besides this, taking into account the results, we make three more salient contributions: we make RIT impact visible in a multi-disciplinary context, problematise the absence of teaching-based research, and present a richer and more complex picture of RIT practice in a teaching-focused institution.

Firstly, our study provides a rich picture of the ways in which RIT impacts research-active teachers' practice, as defined in the UKPSF framework. Our study confirms that the practice of RIT impacts practice in the following ways: (1) RIT makes 'designing and planning lectures' become research-led activities (where current research evidence is integrated); (2) it transforms 'delivery' into a relationship-based classroom time that is dedicated for teaching research methods, and for critiquing and reviewing published research in tutorials, (i.e. utilising a 'research-oriented' and 'research-tutored' conceptions of RIT; (3) it changes 'assessment tasks' into 'research-oriented activities' (in which the mechanics of doing research are embedded); (4) it encourages the development of effective learning environments and makes their student support activities 'research-based' (where students and staff co-produce knowledge); and (5) it makes academics evaluate their work and inspires them to be actively engaged in CPD. Thus, we conclude that RIT positively influences all areas of teaching practice, as specified in the UKPSF. In addition, our data also offer strong support for RIT's impact on teaching as it makes classroom conversations more comprehensible and transparent, and it helps teachers engage in differentiated teaching practices for students of diverse backgrounds and varying abilities. Collectively, these impacts answer in part, Hattie & Marsh's (1996, p. 533) question of why the belief of complementarity between research and teaching exists. Due to the pervasiveness of the synergistic relationship between research and teaching experienced by the academics, the majority of our sample (90%) believed that research is teaching (i.e. R=T), and that all university-teaching must be evidence-based, confirming the experiences of Tong, Standen & Sotiriou (2018). However, we went further in showing that there is a discernible variation in the ways they enacted this belief, and, therefore, the impact of RIT on teaching practice is neither universal nor uniform, among the participants.

Secondly, we highlight the absence of evidence for certain approaches to RIT. While five of the RIT conceptions, described in Table S1 (i.e. research-led, -oriented, -tutored, –based and impact-inspired teaching), were frequently used by the participants, less evidence is found for the remaining two RIT approaches (researching one's own teaching practice and undertaking inquiries on topics inspired by teaching). To realise more fully the transformative power of research-teaching integration and to professionalise academic practice, it may be critical that academics, particularly in teaching-focused universities, engage more in the ways that RIT is viewed in these two conceptions. It is important that academics engage in systematic investigations of the questions related to teaching and learning Prosser et al (2008). In fact, our understanding of the productive ways in which curriculum, assessment, teacher tasks, speed of delivery, technology, methods and strategies come together in real classrooms, in order to make changes in diverse groups of students (Marshall, 2020), is constantly growing. For these reasons, we argue for more teaching-based, teaching-led research, designed and conducted by teachers themselves. To promote RIT, it might be necessary to have a renewed emphasis on teachers' engagement in Scholarship of Teaching and Learning (SOTL), particularly in teaching-focused universities.

Thirdly, while our analysis offers evidence of the potential transformative power of RIT, it also foregrounds a more granular, yet complex, representation of RIT, which has hitherto been insufficiently understood. While this study may be considered as similar to other works that

investigated staff's experiences, it differs from them in its revelation of how time pressures, low-level pedagogical capital in students, a lack of pedagogical research, a misalignment in academics' research interests and teaching workloads, and the need to teach shorter courses that do not offer space for research benefits to emerge, affect RIT practice. Despite these challenges, what helped our sample sustain their commitment as research-active teachers was the possibility of their students becoming critical, creative and confident individuals through RIT. We report that it is the centrality of relationships with students and their outcomes that are critical to these academics' motivation and sustained enthusiasm - a confirmation of the findings of Gale (2011). In this respect, we concur with studies that emphasise the need for culture-changing leadership (Bage, 2019), particularly for making targeted resource decisions and to enabling academics to teach longer courses (Moschieri & Santalo, 2018). In view of making these systemic adjustments in teaching-focused universities, for example, we argue that RIT-inspired leadership teams that advocate a strategic vision for a multi-level integration of research and teaching is needed.

Concluding remarks

Our study has provided some clarity in answer to the question we posed in the title of our article: 'Can Research Informed Teaching transform academic practice?' Our conclusions are not a straightforward 'yes'; although we are confident, we remain cautious in answering this. We are confident because the transformation of certain aspects of the academics' practice did happen because of RIT. Our data support the view that RIT positively impacts designing and planning of lectures, delivery and assessment practices by making them evidence-informed, and inquiry-focused. We also report that new research questions are triggered and classroom communications have become more comprehensible because of RIT. To add to this list, impacts such as improved self-evaluation, increased engagement in continuous professional development, and emergence of the academics' professional identity have also been experienced by the integration of research into teaching. We are cautious, however, that the belief in RIT's impact on themselves and on their practice was not universally held in our sample. There is considerable variation in ways the academics experienced these impacts. What made the impact different was a set of 'identity markers'- termed here as 'the RIT mindset.' It is in conscious cultivation of this mindset, that these academics were able to experience the transformational power of RIT. Our study also reveals that there is a need for a facilitating context that is able to help research-active academics, particularly in teaching-focused universities, manage alignment of teaching workloads with their personal research interests. When academics are able to apply this mindset in an enabling context, it releases the transformative potentials of RIT to change practitioners and their practices for better. This means that for any impact to happen, an integration of research and teaching must be done intentionally with a passion for subject knowledge, alongside an institutional commitment to learning through inquiry, for the benefit of students and societies.

We acknowledge this study's limitations. Our study is centred in a single, fairly-modern, teaching-focused English university, and relies on a small sample of research-active staff, and, therefore, our findings need to be treated with caution. The cross-sectional sample of research-active academics used in this study, while useful in revealing a richer depiction of impact, could be positively biased towards the benefits of RIT, and is insufficient to bring to light the disciplinary differences, if any, of RIT's impact. We encourage further work with larger samples that include those who are on teaching-only / research only contracts, for example, in universities with varying levels of research power and intensity. Further empirical investigations are needed to establish if and how the RIT Mindset enables the integration of

research and teaching for other groups, in intercultural and multi-national contexts. The findings reported in this paper, however, have thrown light on RIT's transformative effect on many aspects of teaching practice in universities, if the 'RIT mindset' is embedded in individuals and institutions. They represent a first step in explaining the need for developing the RIT mindset in academics so that other yet to be known faces of RIT impact are revealed and their teaching practice is set free to become more diverse, impactful and transformative.

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Table S1. An overview of Research Informed Teaching Conceptualisations

S.No.	RIT Conceptualisations	When and how RIT happens?	Theorists / Proponents	What RIT looks like in practice?
1.	Research-led	When teaching is based on the research findings of a particular field of study, RIT happens.	Griffiths, 2004; Healey & Jenkins 2006;	Research findings are taught to students.
2.	Research-Oriented	When teaching is focused on equipping the students with the knowledge of undertaking research in their field, RIT happens.	Griffiths, 2004; Healey & Jenkins 2006;	Research processes and methods are taught to students.
3.	Research-Tutored	When students critique research outputs and discuss their views among themselves and with their tutors, RIT happens.	Healey & Jenkins 2006;	Students learn through critique and discussion between themselves and staff.
4.	Research-Based	When students engage in the co-production of research outputs, RIT happens.	Griffiths, 2004; Healey & Jenkins 2006;	Students learn as researchers.
5.	Researching academic practice	When a pedagogic research informs academic practice, RIT happens. (Also known as Teaching based research)	Boyer, 1990; Hutchings, Huber & Ciccone, 2011; McKinney, 2006; Boshier & Huang, 2016; Charles, 2018	Systematic inquiries on the practice of teaching and learning, and the resulting evidence informs pedagogy.
6.	Teaching that inspires Research	When teaching inspires research activities, RIT happens because the connection between research and teaching is not uni-directional. (Also known as Teaching-informed OR Teaching-led research)	Weller 2016; Willcoxon et al 2011; Visser-Wijnveen et al. 2010; Harland, 2016; Charles, 2018.	Systematic inquiries are based on questions raised in classrooms, or on triggers experienced in teaching practice.

7	Impact-informed teaching	When teaching focuses on ‘research impact’, RIT happens. (Also known as Scholarship of application by Boyer)	Joseph-Richard et al. 2018.	Teaching focuses on the various ways research is applied in real-world settings and how it impacts wider society, businesses, organisations and societies.

(Adapted from Weller 2016; Harland, 2016; Joseph-Richard et al. 2018)

Table S2: Characteristics of academic interviewees selected using a ‘stratified purposeful sampling’ method (n=20)

S.No.	Research & Innovation Hubs (Strata)	Participating academics (Pseudo names)	Research & Teaching Specialism	Gender	Teaching experience (Years)	Job Role	Scholarly Performance (Evidence for being ‘Research-active’)								
							Number of Research Outputs in ORCHID	Doctoral Supervision Completed	Doctoral Supervision On-going	Engaged in PhD Examination	Engagement in Doctoral researcher Development	Success in securing research grants	Reviewing Research papers	Leading Funded Research Projects	Engagement in Research Dissemination
1	Creative and Digital Industries Research & Innovation Hub	Anton	Communications	M	32	P	22	X	X	X	X	X	X	X	X
2		Don	Films & Television	M	20	SL	8		X	X		X	X		X
3		Judith	Visual Art & Culture	F	16	SL	12	X	X		X	X	X		X
4		Amal	Software Engineering	F	10	L	3			X	X	X	X	X	
5		Dave	Creative writing	F	6	L	2		X	X	X	X		X	X
6	Business and Society Research & Innovation Hub	Kavitha	Business Models	M	24	P	34		X	X	X	X	X		X
7		Elango	Criminal Law	F	12	SL	6		X						
8		Jingsu	Governance	M	10	SL	6	X	X		X		X		X
9		Darrah	CSR and Ethics	F	22	L	8		X	X	X	X	X	X	X
10		Neil	Entrepreneurship	F	16	L	2				X		X	X	X
11	Maritime, Technology and Environment Research & Innovation Hub	Leena	Shipping & Ports	M	13	P	30		X						X
12		Frank	Ship building & Business	M	11	SL	3		X				X		X
13		Arjun	Maritime Education	M	8	SL	10		X				X		X
14		Hannah	Climate Crisis	F	12	L	3						X		
15		Gemma	Maritime Ed & ICT	F	7	L	6	X		X			X	X	X
16	Sport, Health and Wellbeing Research & Innovation Hub	Joy	Sport, health, wellbeing	F	30	P	21	X	X		X	X	X	X	X
17		Rita	Sociology of sport	F	14	SL	13	X	X			X			X
18		Feng	Human performance	M	18	SL	14			X		X	X		X
19		Shin	Football-based research	F	13	L	3								
20		Kim	Health & Nutrition	M	9	L	6	X	X		X	X	X		X

Maximum variation sampling: Research Hubs (n=4), Disciplinary variation (n=20), Gender (M=45%, F=55%), Teaching experience (Range 6-32 years), Job Roles (Professors (P)=4, Senior Lecturers (SL)=8, Lecturers (L)=8), Research Outputs (Range 2-34), Doctoral supervision completed=35%, Doctoral Supervision ongoing=70%, Engaged in PhD examination=40%, Engaged in doctoral researcher development=50%, Reviewing Experience=75%, Leading Research projects=35%, Dissemination=80%.

Figure 1

A1. Design and plan learning activities and/or programmes of study
A2. Teach and/or support learning
A3. Assess and give feedback to learners
A4. Develop effective learning environments and approaches to student support and guidance
A5. Engage in continuing professional development in subjects/disciplines and their pedagogy, incorporating research, scholarship and the evaluation of professional practices

Figure 1: Five ‘areas of activities’ of a HE lecturer, identified in the UK Professional Standards Framework.

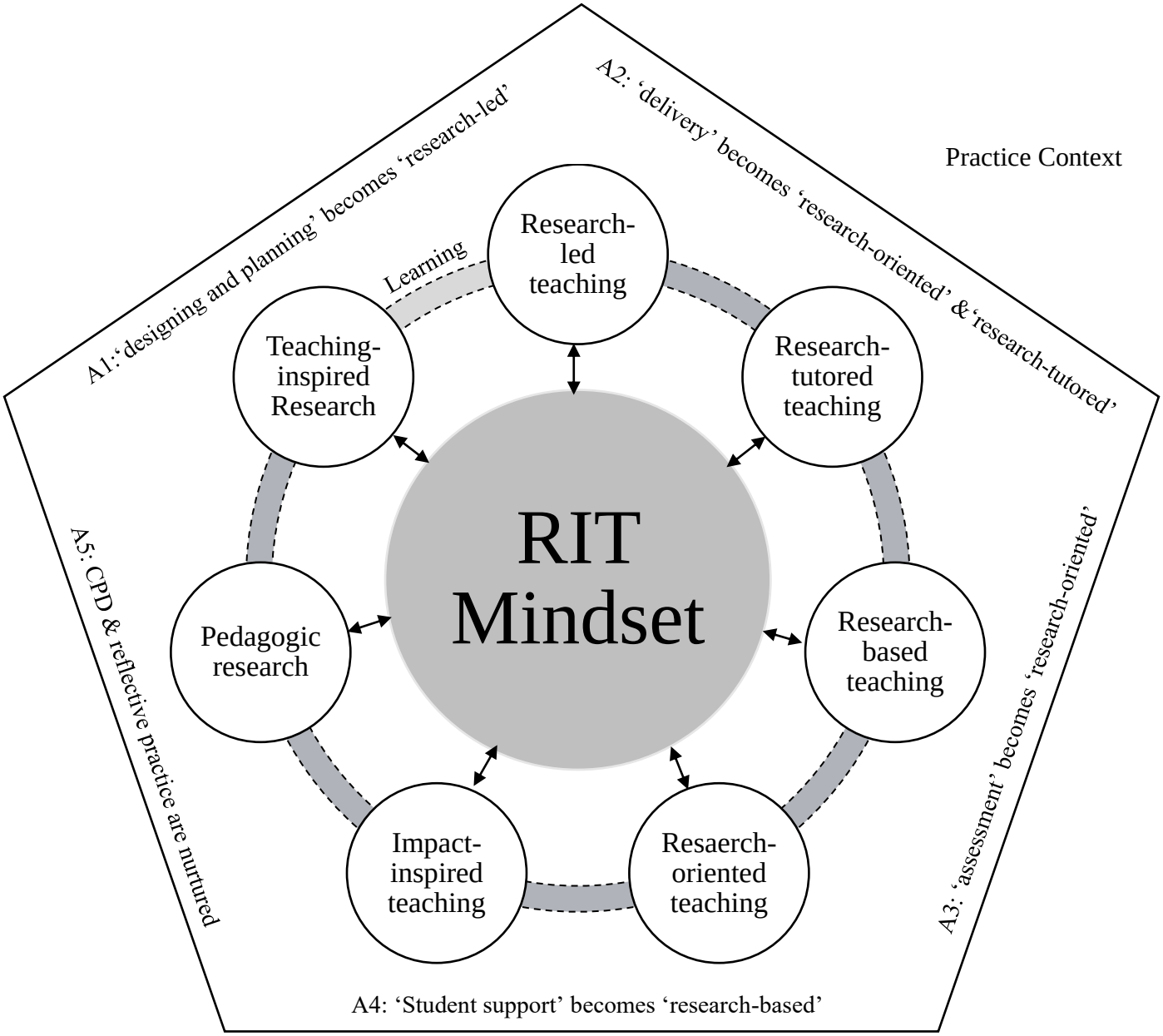

Figure 2: RIT mind-set – The critical core of Research Informed Teaching practice.