

Minimising risks in research-informed teaching

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Reported benefits of research-informed teaching include enhanced student engagement and graduates that are better prepared for employment in an uncertain world. However, there are a number of academic risks that can have both positive and negative impacts on staff and students when implementing research-informed teaching. Mitigating such risks could smooth the way for, or even encourage, wider exploration of innovative teaching methods with associated benefits. This paper presents findings of an empirical study that identifies what risks were encountered or perceived from both student and staff perspectives when adopting a research-informed teaching approach. Risks were identified through semi-structured interviews with multi-disciplinary staff and a questionnaire survey with students. Two risk categories were revealed as particularly significant for student learning: curriculum bias and how research engagement impacts on student experience. Staff reported considerable positive impacts on well-being and motivation when adopting research-informed teaching. In light of this, the frequently encountered strategies for staff to reduce risks and negative impacts are presented, including raising awareness of key teaching styles or methods and fostering a sense of wider cultural support for innovative pedagogies within and between disciplines and departments. More could be gained by acknowledging and managing the risks associated with research-informed teaching than by strategically avoiding this type of activity.

Keywords: research-informed teaching, risks, student learning, teaching strategies

Introduction

The Higher Education Funding Council of England (HEFCE) has been considering a framework of academic risks since the turn of the century. This framework initially provided risk management guidance that

included a broad range of individual risks at every level of an Higher Education Institution (HEI), later offering a more structured set of risk prompt lists, and finally settling on a flexible focus around ‘risk areas’ (Huber, 2011). It is within this framework of risk management, as per the HEFCE Good Practice Guide (HEFCE, 2005), that Huber (2011) considered a number of institutional risk registers and identified an increasing emergence of ‘teaching risks and ‘research risks’ alongside the more familiar organisational risks. He further revealed that ‘teaching risks’ are rarely aligned to teaching practice due to the difficulties of predicting and assessing quality and innovation, hence risks are more likely to be identified from contextual views of teaching, typically through student perceptions of their experiences. Teaching risks are more likely to be identified by institutions if they are resolvable. Where there are tensions, such as in the relationship between teaching and research, attempts at resolution via a risk management approach tend to be avoided (Huber, 2011).

In the UK, academic standards are established and maintained by HEIs themselves, underpinned by the use of external examiners, standard sets of indicators, professional bodies where applicable, and input from the Quality Assurance Agency (QAA), a state-owned body with responsibility for currently monitoring quality in HEIs. Institutions have autonomy to design and develop their own undergraduate and postgraduate programmes of study, with QAA guidance such as subject benchmark statements that include core competencies in a range of disciplines (ECCTIS, n.d., para 10).

Risk has occupied a prominent place within the higher education agenda in England in recent years. In 2011, the Coalition Government’s White Paper, *Students at the Heart of the System*, invited HEFCE to consult widely on the proposed introduction of a more risk-based quality assurance system for higher education providers subscribing to the QAA (HEFCE, 2012). Such a system intended to focus limited agency resources on the perceived riskier elements of the system where regulatory objectives might be threatened (King, 2014). The response to the consultation, and subsequent guidance to the QAA, aimed to ensure that students would ‘play a more prominent role in assessing their own academic experiences’ from 2013/14 onwards (HEFCE, 2013). Meanwhile, in 2012/13 the cap on university tuition fees was increased considerably, moving higher education toward a greater emphasis on ‘students as consumers’ and a focus by quality assurance mechanisms to ensure learning experiences and high student satisfaction levels were at the centre of policies and university strategies (Detourbe, 2014).

In the US, this approach has dominated the higher education system

for many years, with students ‘as customers’ having influence over quality assurance via extensive feedback opportunities through the country’s long established self-study, peer driven, regional, state-based and institutional level quality assurance system (Rhoades and Sporn, 2002). Other countries have already adopted a risk-based approach to quality assurance. For example, in Australia, the Tertiary Education Quality and Standards Agency uses a regulatory risk framework in its role of regulating higher education providers (Department of Education, Employment and Workplace Relations, 2012). Within overarching ‘threshold standards’, ‘risk consequence areas’ are identified, including a number of risk categories affecting students. These categories include several teaching risks in relation to students, such as those affecting student attrition, student progress and satisfaction levels. Academic quality is also assessed, for example, around compliance with professional accreditation.

If students are to be encouraged to play a more prominent role in assessing their own academic experiences, it falls to individual academics to adopt appropriate teaching styles and to be reflective of their effectiveness. Inclusive modes of teaching and learning, where, for example, students learn by co-creating and engaging in research as an integral part of their programmes of study, have been much discussed in higher education literature during the past twenty years (Brew, 2006; Gresty and Edwards-Jones, 2012; Healey, 2005; Zamorski, 2000). A great deal of early debate around the subject centred on, and questioned, the extent of a link between teaching and research (Barnett, 1992; Hattie and Marsh, 1996). It subsequently moved on to highlight the potential benefits of this link (Griggs, 2005; Hajdarpasica, Brew and Popenici, 2015; Jenkins, Healey and Zetter, 2007), particularly to students through forms of inquiry-based learning (Elton, 2001), and more recently, exploring the most effective ways of making these connections in practice (Elsen et al., 2009; Jenkins and Healey, 2005; Healey and Jenkins, 2009). Although Griffiths (2004) presented research-informed teaching (RiT) as one aspect of the teaching-research nexus, in which teaching draws on specific research around the teaching and learning process itself, the concept quickly became generalised to encompass a breadth of practices that brought teaching and research together to benefit student learning. It was popularised in the UK when HEFCE provided additional Teaching Quality Enhancement Funding to HEIs to support ‘teaching informed by research’ – funding that was to be used to develop strategies supporting the linkage between teaching and research. As a result, many initiatives were instigated within and between institutions throughout the country, ranging from small short-

term projects or the development of targeted strategies and curriculum reviews (e.g. University of Bedfordshire, 2010) through to sustained structural innovations such as the University of Central Lancashire's Centre for Research Informed Teaching (UCLAN, n.d).

Furthermore, there has been an increasing focus in the pedagogic literature on the role and importance of RiT in the preparation of students for an employment market caught up in an accelerating pace of change (Bourner, Heath and Rospigliosi, 2014), and for an unpredictable, uncertain and 'supercomplex' world (Barnett, 2012). Indeed, Ozay (2012) questioned whether undergraduate students are gaining the attributes necessary to cope with the complexities of an 'information driven society'. The ability of graduates to be able to quickly and effectively understand and interpret complex information within a workplace setting is more likely to be gained through innovative teaching practices which incorporate research-led methods that, by default, tend to develop those very attributes. Costello, Brunner and Hasty (2002) suggested that for students to transition to a modern environment of empowered workers, they must first experience a more empowered classroom, with less-traditional pedagogies. This was referred to by Brew (2010) as 'scholar-focused learning and teaching' and although the benefits of fostering a culture of innovative teaching practices have been well reported (Bauer and Bennett, 2003; Jenkins, Healey and Zetter, 2007; Russell, Hancock and McCullough, 2011), the associated risks need to be identified and managed. This is a relatively unexplored area of study to date, which provided the focus for a conceptual review of the literature by Gresty *et al.* (2013). One of the aims of that review was to monitor thematic trends in risk management research over time and to map where these trends link to the research-teaching nexus in higher education. Gresty *et al.* (2013) re-conceptualised barriers, challenges and issues from published, contemporary RiT case studies as risks. Where examples of such risks were reported from education or discipline-based studies, they were categorised into a risk framework. This framework was advocated as a tool to enable a risk management approach to be adopted when planning or delivering novel teaching activities.

Following on from the Gresty *et al.* (2013) review, this present paper presents more empirical and interdisciplinary research regarding a risk management approach to RiT. The research was guided by the following questions:

1. What are the key risks of research-informed teaching affecting students and staff?

2. What are the main impacts of any identified risks on teaching and learning?
3. What staff strategies can be identified for managing these risks, based on teacher and student experiences?

Research methods

This investigation extended the literature review and preliminary study of risks of RiT previously reported by Gresty *et al.* (2013). The methodology adopted a single case study approach utilising multiple data points (Yin 2014) across three discipline areas at one UK university. The three distinct discipline areas of Biological Sciences, Business Management and Environmental Building were selected to generate a richness of data that might be limited if examining a single discipline area (Jenkins, Healey and Zetter, 2007). Three disciplines helped to enlarge exposure of the study to different students and teachers and therefore potentially enriched the examination of the risks, learning impact and mitigating strategies in a wider context. The benefits of developing an interdisciplinary approach to learning and teaching have previously been identified in the literature (for example: Lattuca, 2001) and underpinned this research.

Within the single case study, the methods chosen were intended to triangulate the data following Miles and Huberman's (1994) distinctions:

1. Data source (university lecturers and university first, second, placement and final year students across three academic disciplines);
2. Method (semi-structured in-depth interviews and online questionnaires gathering qualitative and quantitative data);
3. Data type (transcribed interview text, open-ended survey question text responses and quantitative survey data) .

After ethical approval had been gained from the University body, in-depth interviews were used to develop an insight from lecturers regarding risk and mitigation strategies adopted in RiT. The in-depth interviews used a generic purposive sampling method (Bryman, 2012) to recruit teaching staff from the three faculties. Academic staff selection was based on those who: a) had taught undergraduate students and b) had recent experience of delivering RiT. Participants were identified and approached after discussion between the study's researchers and also liaison with the Associate Dean (Teaching and Learning) from each represented discipline, who had first-hand knowledge of staff teaching

practices within their domain. Fifteen lecturers were interviewed, five from each discipline. This was deemed as appropriate to achieve theoretical saturation (Bowen 2008).

The semi-structured in-depth interviews were designed to allow dialogue to flow while keeping control via use of planned key questions (Knight, 2002). As well as identifying specific risks associated with RiT, academic interviewees were asked:

- to identify issues that they needed to consider when planning to engage students in RiT;
- whether they were aware of any potential risks of engaging students in RiT prior to delivery;
- whether they could specify any actions they took to minimise any negative impacts of engaging students in RiT;
- to identify strategic implementation of engagement with RiT at the programme, subject/discipline and departmental level.

The interviews were digitally recorded and transcribed for thematic analysis. The scripts were imported to NVivo qualitative data analysis software allowing thematic comparisons to be made across individual responses, as well as identifying any broad-based themes. This approach to the qualitative analysis generally followed the constant comparative method (Glaser and Strauss, 1967), specifically supported by the Framework Method (Gale *et al*, 2013); an approach which enables the researcher to easily move back and forth across data within individual, as well as between multiple, sources in order to recognise coherent accounts and commonalities (see Smith and Firth, 2011). Data were initially summarised at the individual level and coded to specific themes. These themes were then compared in turn across the collective until saturation was reached, in that no new information could be introduced to the themes and provide additional meaning (Boeije, 2002). Finally, the data were collated within broader themes aligned to the three original research questions. Any risks that did not sensibly fall within a labeled category were located under an 'other factors' category.

For the quantitative part of this study, an online survey was used to collect data from all registered undergraduates in the three disciplines. The survey instruments were designed and generated online using Qualtrics Survey Software and disseminated to 2440 students via an email link. The survey consisted of a combination of Likert scale questions, open text entries, and single answer multiple choice questions for demographic information. The survey included four sections that covered broad risk categories, being:

- the level of student engagement in RiT (five point scale: Strongly Agree to Strongly Disagree);
- bias in curriculum delivery and learning as an outcome of RiT (five point scale: Strongly Agree to Strongly Disagree);
- the ability of a student to cope with the style and expectations of RiT (five point scale: Strongly Agree to Strongly Disagree);
- the impact of RiT on the student experience (five point scale: Extremely Important to Not Important at all).

Each of these sections contained four statements that reflected specific risk factors derived from Gresty *et al.* (2013). The resultant data were exported to SPSS for analysis, and the open questions in the survey were thematically analysed to reveal the most common student-perceived impacts of the risk factors.

To determine the internal reliability of these categories, a two-tailed inter-item Pearson correlation analysis was conducted. Further correlation analysis was conducted to determine the strength of association between the risk categories and a dependent variable drawn from responses to a question in the survey that asked students to rate the importance of engaging with research in relation to improving their skills, increasing their confidence, enhancing their employability and learning greater knowledge. Finally, consistency of response was examined between the first 10 per cent and the last 10 per cent of responses received. On the 25 variables examined only one variable showed a significant difference (at the .05 level) in how the respondents answered, strengthening the claim of reliability between the sample and population.

Results and analyses

The number of responses to the student survey totaled 262, equating to a 10.7 per cent response rate (199 complete responses, 63 partial responses). The student gender ratio was 47.2 per cent male and 52.8 per cent female which virtually mirrored the university undergraduate profile of 45.3 per cent male and 54.7 per cent female, suggesting consistency with the wider university population. Student numbers were broadly dispersed across the Higher Education (HE) stages of study (35 per cent in the undergraduate first year, 20 per cent in the second year, and 37 per cent in the third year, with 8 per cent in a placement year between the second and final year.

Risks to RiT

Risks associated with the level of student engagement in RiT

Staff identified non-engagement of students as the number one risk

associated with their RiT practices. From the 15 staff interviewed, 11 highlighted a range of perceived causes of non-engagement including: non-attendance, student distraction, dull lecture delivery, introduction of research too soon, too much novelty and demotivation of less able students:

‘... you have to be aware of some students ... who are not terribly good or really keen on doing research ... could be quite turned off by research.’ (Lecturer, Biological Sciences)

‘To expect the individual to do [specific research], in terms of timescale, I think one has to be careful to put it in manageable chunks...Otherwise, I think what you get is the disillusionment that this is impossible, it’s just too much and therefore there’s a kind of, “Oh, research!” – switch off.’ (Lecturer, Environmental Building)

From the student survey, 40 per cent (94) of respondents agreed that the level of engagement with research overall was an issue of concern, with another 20 per cent (47) neither agreeing nor disagreeing. The main concern from the student perspective was the need to slowly build up their skills and confidence to be able to effectively engage with research (74 per cent agreed or strongly agreed). Of the 39 per cent (91) who agreed or strongly agreed that they had not yet attained sufficient knowledge within their discipline to effectively engage with research, a third were in their final year. Survey data indicated that students place slightly more emphasis on enhancement of research skills compared to subject knowledge enhancement as they progress from their first to their final years.

Students identified two key positive impacts of engaging with RiT: increased subject knowledge through, for example, greater access to teachers during research activities, supporting lecture materials, and helping students relate theory to practice (n = 10); and improved independent research skills, including greater understanding of research source materials, and increased ability to locate relevant resources (n = 7). A number of negative impacts relating to this risk category were also identified, including poor preparation for the undertaking of a culminating academic research, or ‘capstone’, experience such as the final year research-based dissertation (n = 18):

‘At this stage I would not feel confident to conduct my own research. I am taking a year out to help a PhD student complete

his thesis next year so hopefully then I will be able to conduct my own research.’ (Second year Biological Sciences student)

‘Feeling insecure about doing research, as we have had little individual practice before.’ (Final year Biological Sciences student)

An over-focus on research engagement to the detriment of other aspects of the curriculum was another negative impact highlighted by some students (n = 10), as was an enhanced student interest in research that may not be supported by opportunity and personal development, potentially leading to frustration and disillusionment (n = 5).

Risks associated with bias in curriculum delivery and learning as an outcome of RiT

Six of the 15 staff interviewed identified this risk as a potential consequence of RiT:

‘I think there is a risk that you could lose students because you are immersed in your own area, and you forget that actually it’s quite difficult, and they might not have got the basics in place.’ (Lecturer, Biological Sciences)

‘You should start with formal learning outcomes and you should ensure that you are properly meeting those outcomes. So there’s a danger that you miss things out and there’s a danger that you run out of time because you’ve had an aside. I think you’ve got to know that that aside is going to be useful for students.’ (Lecturer, Business Management)

A similar proportion of the students surveyed (36 per cent) determined that the set of factors comprising this category posed a potential risk to them. In this group, two risk factors were most frequently reported. The increased pressure that research engagement places on a student to develop their research skills (relative to other skills and attributes) was a risk to 56 per cent of student respondents, while a similar result was found for the perception that where teachers encourage research engagement, teaching is typically biased toward staff research interests (labelled ‘curriculum bias’ by the researchers). The notion that research engagement could be detrimental to the development of practical skills was rejected by over 70 per cent of the students surveyed. One overriding positive impact of curriculum bias

identified by students was that they perceived better quality teaching and learning due to greater knowledge, enthusiasm, confidence and passion of the teacher resulting from greater familiarity with areas of expertise (n = 12).

A number of potential negative impacts associated with these risks were also raised by students. It was felt by some that course/session content may not meet student expectations due to, for example, limited subject areas and methods being covered leaving potential learning gaps, or that research (projects and modules) was not always relevant to their direct interests (n = 13):

‘The course content is sometimes biased towards the lecturer’s own work, which can be helpful in the sense that they are very knowledgeable and enthusiastic about the topic, but equally it is unidirectional for those who are interested in another area.’
(Second year, Biological Sciences student)

A few students reported feeling intimidated or restricted in respect of expressing alternative views to that of a teacher (n = 5), and there were also suggestions of student disengagement where individual staff research interests becomes a teaching focus, and conversely where potential alternative student interests are ignored or limited (n = 4).

Risks associated with student ability to cope with RiT style and expectations

Eleven of the 15 staff identified ‘student ability to cope’ as a potential risk to RiT. However, only 37 per cent of students agreed or strongly agreed that this was an area of concern to them, with their concerns more focused upon ‘teachers who are very focused on their own research and are harder to access for help and advice’ (n = 86) and a tendency to get confused when having to ‘conduct complex literature reviews’ (n = 92).

Very few positive impacts were highlighted by student respondents for this category, although a small number of final year students (n = 3) found that the challenges of research engagement spurred them on to work harder to cope with the demands, for example through wider reading and using new data analysis tools. The main negative impact identified by students in this category was that having to cope with RiT generated a sense of stress and/or anxiety in them; for example, from dealing with the uncertainty of research (with unexpected results) or understanding new terminology (n = 8):

‘Not having enough information about *how* to research has impacted on coursework results as I believe that it causes you to shut down when you don’t understand.’ (First year Biological Sciences student)

Several students found they struggled with insufficient time to fit in research with other learning (n = 7), and a small number of individuals expressed difficulty with managing unclear expectations i.e. resulting from ambiguous practical instructions, lack of guidance, limited resources, and lack of access to research-active staff (n = 4).

Risks associated with the impact of RiT on student experience.

The types of risks that emerged from the staff interviews in relation to this category included the possibility of complacency amongst teachers, student learning outcomes not being met, receiving negative student feedback (on a module or programme level) and poor teaching quality that can result in student confusion. Only 25 per cent of student survey respondents agreed that their experience was at risk as a result of research engagement, with a further 21 per cent neither agreeing nor disagreeing with this view.

A relatively small range of positive impacts were offered for this risk category, although it attracted a greater number of responses than questions in other categories. One positive was that students felt they gained greater understanding and subject knowledge; for example, through more reading, greater stimulation, and generation of ideas (n = 11). Some students also felt that their research skills had improved, including accessing resources, and developing independent critical thinking (n = 6). Of the negative impacts reported, the most notable were: unrealistic expectations of students by staff, e.g. manifested through a lack of guidance on complex research issues (n = 6), and that students might find little enjoyment or satisfaction in their studies, reporting ‘tedious learning’ and time wasting through perceived unnecessary research detail (n = 4):

‘I believe there is too much emphasis on research in this degree, students need more practical work experience and practical tuition.’ (Final year, Biological Sciences student).

Other risks and impacts experienced by staff

Thirteen of the fifteen staff interviewed recognised positive impacts of RiT in relation to their own general well-being, with references to feeling enjoyment, excitement, satisfaction, greater confidence,

empowerment, esteem with students and more motivation. Fewer negative responses were given; these included frustration, anxiety and greater demands on time as a result of the additional planning and organisation of activities. A range of conflicts between the requirements or expectations of professional accreditation bodies and curriculum content were reported as an issue by nine of the staff interviewed. Specifically, risks focused on the differing views of skills and attributes that graduates should be able to offer, the debate around whether courses were too vocational versus too academic, and whether external accreditation criteria are too prescriptive thus restricting creativity. Other interviewees reported no tension in this area, with one person even acknowledging that the accreditation process can encourage innovation in teaching delivery.

Student survey data

Key findings to emerge from the data focus on the student perceptions of the core risk categories, the impact of RiT on student learning and the association between learning and the core risk categories.

Most respondents were neutral or disagreed with the statements posed (See Table 1, where scale items were written as negative statements) under the four core risk categories.

However, some statements that students identified more closely with include: *I need to slowly build up the skills and confidence needed to effectively engage with research* (mean = 2.15); *engaging with research places increased pressure on me to develop my research skills* (2.61); and *I find that where teachers encourage research engagement, teaching is biased toward their own research interests* (2.49). This last item relating to lecturers own research interests is also echoed in the following result: *Teachers who are very focused on their own research are harder to access for help and advice* (2.77).

The importance students place on RiT to improve a variety of attributes is highlighted in Table 2. These include enhanced skills (mean = 1.69), confidence (1.98), employability (1.76) and learning knowledge (1.65). These findings are further supported by a more negative response to the first item in Table 1, where students did not agree that 'engaging with research adds little value to my learning' (3.71). Composite variables were constructed for 'RiT impact on student learning' from the scale items shown in Table 2 and for the four core risk categories from the items under each heading in Table 2; these composite variables were then used in the correlation analysis. As illustrated in Table 3, there are moderate (> 0.3) but significant ($p = 0.01$) correlations between the importance of research engagement to student learning and the four core

TABLE 1
Student perceptions of the core risk categories

Core Risk Categories	N	Mean	S.D
<i>Level of engagement with research</i>			
Engaging with research adds little value to my learning	251	3.71	1.167
I need to slowly build up the skills and confidence needed to effectively engage with research	251	2.15	.871
A change of teaching style from a traditional lecture format to a more research-based format would make me feel insecure	251	3.16	1.059
I have not yet to attained sufficient knowledge within my discipline to effectively engage with research	251	3.02	1.152
<i>Curriculum bias</i>			
I find that engaging with research detracts from learning about subject content	222	3.50	1.100
I find that engaging with research has a negative impact on my practical skills	222	3.86	.950
Engaging with research places increased pressure on me to develop my research skills	222	2.61	.939
I find that where teachers encourage research engagement, teaching is biased toward their own research interests	222	2.49	.964
<i>Coping with research engagement</i>			
I find the added responsibilities of active research engagement are difficult to cope with	208	3.05	.942
Teachers who are very focused on their own research are harder to access for help and advice	208	2.77	1.095
I tend to get confused if I have to conduct complex literature searches	208	2.86	1.158
Engaging with research causes me to feel anxious and stressed	208	3.04	1.055
<i>Effect of research engagement on student experience</i>			
I find that engaging with research contributes to an unsatisfactory student experience	201	3.69	.973
I have found that my teachers are poorly trained in research engagement methods	201	3.61	1.053
I have found that many ideas for engaging students with research are poorly executed by teachers	201	3.13	1.016
I would give poor module feedback if a course included a lot of research engagement	201	3.39	1.117

Note: 1= Strongly Agree: 5= Strongly Disagree

risk categories of RiT. The strongest association between risk and student learning centers around curriculum bias ($r = -.434$; at $p < 0.01$ level), followed by risk associated with student experience and student learning ($r = -.385$; at $p < 0.01$ level).

TABLE 2
RiT impact on student learning

	N	Min	Max	Mean	S.D.
Improving skills	200	1	5	1.69	.712
Increasing confidence	200	1	5	1.98	.992
Enhancing employability	200	1	5	1.76	.916
Learning knowledge	200	1	5	1.65	.679

Note: 1= Extremely Important: 5= Not at all Important

TABLE 3
Association between student learning and four core risk categories

		Level of engagement with	Curriculum bias	Coping with research engagement	Research engagement on student experience
Importance of research engagement to student learning	Pearson correlation	-3.10**	-.434**	-3.09**	-3.85**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	200	200	200	200

Key extrinsic risks (identified by staff only):

Nine of the 15 staff interviewed believed that the time consuming nature of the processes involved in effecting curriculum change presented a risk to that change being actioned in the first place. In addition, just under half indicated that the lack or withdrawal of funding or other resources (such as technology), presented a risk to adopting more innovative modes of RiT. Indeed, in two instances, a perceived direct link between reduced funding availability and less use of RiT was suggested.

Other extrinsic risks to adopting RiT worth noting were issues relating to departmental culture ($n = 5$) and large class sizes ($n = 4$).

Staff strategies for management of identified risks

Thematic analysis of the 15 staff interview transcripts generated ten dominant themes that staff adopted as risk management strategies when planning or implementing RiT.

1. Apply appropriate teaching styles (n = 11)

To minimise student non-engagement, teachers advocated adopting a structured, incremental approach to building up student research skills rather than ‘dropping them in at the deep end’, as well as including a varied pedagogy to increase the chances of matching student learning preferences to classroom activities:

‘I think it’s gradual, but I’m constantly trying to up the game on all the levels ... so there’s like a gradual learning curve in having a meter in the hand and being in a building in year 1 and doing some more in depth in year 2 ... which can then lead into a research project which is even more in depth in the final year.’
(Lecturer, Environmental Building)

‘Have a go at something and if it works and suits your style of teaching, stick with it.’ (Lecturer, Business Management)

2. Review and plan course content (n = 10)

Two-thirds of staff identified the process of regular course review and planning in order to address risks of curriculum bias and reflecting on existing teaching practices:

‘I just think you have got to be sensitive towards what some [students] are interested in and not over-egg it; you have got to try and find a middle line, not spend the entire time talking obsessively about your own research ... or getting the level wrong. Just recognise you have got a group of students that are at different levels.’ (Lecturer, Biological Sciences)

3. Foster a sense of cultural support (n = 9)

This category incorporates comments made by staff in relation to the attitudes of colleagues in the wider institution, departments and schools toward RiT and their influence over its adoption in programmes.

‘Module teams and programme teams should regularly get together and talk about how we teach and research, but often people work in silos and that’s quite difficult.’ (Lecturer, Business Management)

‘I raise awareness of the importance of research-teaching in the group so as to have better recognition and therefore support.’
(Lecturer, Environmental Building)

4. Ensure module guides are flexibly written (n = 7)

Nearly half of the interviewees pointed to the ability to write module guides in such a way as to minimise the chances of falling foul of accreditation body expectations and stifling use of innovative teaching methods:

‘So there are broad constraints in terms of the learning outcomes you need to achieve and the kind of methods you would use in the module but the detail is really down to you so I don’t think there’s too many constraints there.’ (Lecturer, Business Management)

5. Promote good practice (n = 6)

In this category, staff felt it important that successful applications of innovative practice should be actively shared between colleagues. This would serve to promote RiT as well as potentially raise standards:

‘I think the only thing you can do [to encourage research-informed teaching] is; it’s about sharing practice just like with students, with colleagues you’ve got to engage them into thinking there’s something in it for them.’ (Lecturer, Business Management)

6. Strengthen course and activity evaluations (n = 5)

More robust and regular course and specific activity evaluations, including proactive seeking of student feedback, formed the principal elements of this strategy:

‘The key way of managing that risk is, obviously, to get regular feedback from the students. Say to them, in class, “Are you happy? What’s going on? Are you following it?” So, feedback from them and also if you’re doing anything a bit outlandish, then have a chat with the external examiner as well, get them on board.’ (Lecturer, Environmental Building)

7. Raise awareness of RiT (n = 5)

Several interviewees reported discipline-based environments where there was a poor or non-consensual understanding of RiT. To tackle these issues, several suggestions were made that could result in greater

awareness across the disciplinary unit; for example, production of clear policy documentation and promotion of innovative teaching practices within appraisal systems:

‘I think that as far as research-informed teaching is concerned, a very, very important part of it is, if you like, arrows or pointers or, if you really like this stuff, here’s where you go. I think, for a higher education institution, that’s fundamental. That’s not to say everybody’s going to do it ... but I think that the tools are there is vitally important.’ (Lecturer, Environmental Building)

8. *Provide focused student supervision and guidance (n = 5)*

A third of staff recognised the significance of providing project supervision such that early warning signs of struggling with complexity of research could be identified. Tutors could also try to match individual student strengths with suitable projects:

‘For me, the major risk is in terms of mind overload for them, whether they’re finding it tough, is [identified] through pastoral care really; but then I think that’s an important part really, if you’ve got the time, of every programme.’ (Lecturer, Business Management)

9. *Reflect on own teaching practices (n = 5)*

Staff engagement in pedagogic research, and even some time spent during the summer break reflecting on the previous year’s practices, might help address the risk of curriculum bias and student non-engagement:

‘I’m a problem-solver ... my approach to teaching is a bit the same. So, rather than say I’ve got three practicals to do, and get a text book off the shelf, what I would do is say “Okay, I’ve got three practicals to do. Right, here’s a journal, this year’s version of that journal, my job is to get three practicals out of the articles in that journal”. Then I’ll go through and look at them and think “I could use that. Now, how would that work?” Sometimes you’d think “No, that one wouldn’t work”, and then you move on. That’s often how I do it.’ (Lecturer, Biological Sciences)

10. *Review assessment practices and marking schemes (n = 4)*

The final category included a small number of suggestions that considered adoption of assessment practices that were more aligned to

novel RiT methods, for example, by rewarding process as much as outcomes:

‘... most of that debriefing comes post-game [simulation] and if you use assessments as part of that and if you don’t make the assessment too much orientated towards performance, just what they’ve evidenced from their learning then it fits very well and the total process probably takes less time [than running tutorials].’ (Lecturer, Business Management)

Discussion

The risk framework originally described in Gresty *et al* (2013) helped to provide a structure to explore the three questions posed at the start of this study.

1. What are the key risks of RiT to students and staff?

This study identified a series of commonly encountered risks associated with RiT from both staff and student perspectives. The most frequently encountered and anticipated risks centered on the matter of student engagement in teaching and learning. For teachers, the biggest concern revolved around student *non-engagement* which may be evidenced by, for example, non-attendance, disillusionment, and loss of confidence in doing research as a mode of learning. This finding supports Snyder’s (2003: 160) claim that ‘the risk that students will not participate or use higher order thinking skills’ is the biggest barrier to active learning. Students, however, were more wary of the *level of engagement* in research throughout their programmes, citing the need to slowly build up their skills and confidence to be able to effectively engage with research. One potential benefit of a gradual approach to learning is reflected in the increasingly positive accounts of impact on research skill development by the time students reach the final year: when the need to complete the capstone research experience (i.e. dissertation) is paramount. Joham and Clarke (2012) also provided more evidence of this, showing that student’s learning through unfamiliar and challenging methods could be aided by a carefully structured and supported approach by staff.

In line with the findings of Wilson *et al* (2013), the majority of the interviewed staff believed that a student’s ability to cope with research concepts could pose a risk to the teaching mode used. Evidence from students in the current study also shows they recognised a number of aspects associated with research-based learning that had the potential to cause difficulties to their academic development, such as the onset of

stress and anxiety, and the impact of trying to balance learning in research-mode with other forms of learning. However, being able to deal with stress and anxiety due to encounters with uncertainty is something that can actively prepare students for life beyond uncertainty in a 'supercomplex' world (Barnett, 2012) and should not necessarily be avoided.

A small number of extrinsic risks to RiT were specifically raised by interviewed staff. The integration of teaching and research was seen to be affected by policies, procedures, and culture at local (department) as well as the institutional level. Particularly, quality assurance procedures for implementing changes to the curriculum were identified by more than half the interviewees as often being too cumbersome and restrictive, hence limiting flexibility to introduce new modes of teaching. As Pan, Cotton and Murray (2014) also concluded, academics may therefore be put off introducing innovative teaching and assessment practices in the first place.

2. What are the main impacts of these risks on teaching and learning?

Nearly all the staff interviewed for this study reported positive impacts of RiT on their general wellbeing, due for example to greater personal motivation and satisfaction. Overall, students were also positive about the impacts on their learning, echoing the key findings of Puntha (2011). In particular, students at all years of study saw RiT as providing a better, more enthusiastic and passionate quality of teaching, with teacher 'interest' perhaps becoming more prevalent toward the final year, rather than teacher 'knowledge'. Involving students in research as a learning method was also thought to increase subject knowledge and levels of understanding, and develop independent research skills. These findings align with those of Spronken-Smith, Miroso and Darrou (2014), who studied student perceptions of research-active staff at a research-intensive New Zealand university. However, a number of negative impacts were also experienced by students. Most notably was that of poor preparation, caused by the student not having the confidence or ability to conduct independent research or understand research concepts.

In this study, students identified several reasons for a lack of research-readiness, including insufficient guidance from supervisors, lack of training on the use of technology and equipment, or having little prior 'practice' of certain research skills such as academic writing, literature reviews, conducting experiments etc. Curriculum bias refers to the actual or perceived practice where a teacher uses a disproportionate amount of teaching time to explore their own research interests or methods. It has been noted that active research staff are 'hardly worth

their salt' if not regularly reporting back on their latest findings to undergraduates (Hughes and Tight, 1995) but a balance needs to be struck to ensure wider subject knowledge is not sacrificed for more narrow, self-generated results or methods.. Over a third of staff and students in this study felt that a genuine risk of RiT was that it could lead to bias in terms of delivery of curriculum content. The dominant concern arising from experiences of curriculum bias in the classroom was that the course content did not meet student expectations, particularly amongst those in the final year of study. This potential risk echoes Trowler and Wareham's (2007) 'dysfunction' or 'patchy coverage of curriculum' that may result from a more research-based pedagogy.

There was also evidence of growing student concern, throughout all study years, of research taking up valuable learning time that could also be spent on revising knowledge content, presenting high quality assessed coursework, or learning important career-enhancing technical and practical skills. Not surprisingly, the potential impact of these concerns on future careers was most prevalent among final year students. This questioning of the value of more research-based teaching compared to traditional didactic modes of teaching at key stages of a student's learning, was also a conclusion of Machemer and Crawford's (2007: 28) study, albeit of a mixed-level single class: simply, 'the students valued anything that they perceived as improving exam performance'. This view could reflect strategies that some students adopt when struggling to meet research demands, also noted by Johnes (2006), where a culture of maximising marks at the expense of a breadth of learning appears to be prevalent.

'Student ability to cope' was raised as a major concern by staff. This was not a general comment about students' intellect *per se*, but a perceived risk that when RiT methods are employed some students may not possess the intellectual maturity to cope with research concepts at that stage in their academic development. This risk was therefore more pertinent to teaching at earlier HE stages and as Snyder (2003) observed, it is important to first build up students' self-esteem and confidence with the expectation that academic performance, motivation and active engagement will follow; most likely to be demonstrated in the final year for undergraduates (Hughes and Tight, 1995). Interestingly, there were one or two teachers that did not see this issue as a risk in the present study, instead viewing it as an important lesson to 'throw them in at the deep end'. This was not a widely reported strategy and its impact in this context remains unexplored. However in her study on 'who makes it and who doesn't' regarding students' transition to independent doctoral

research, Lovitts (2008: 317) reported one staff member as saying 'People [who] are at the deep end [are] left to drown, especially the ones who can't swim very well.' The merits or otherwise of adopting this particular strategy as a means of developing research skills are clearly worth more investigation.

3. What strategies can be identified for managing these risks?

Any risk to learning can potentially act as a barrier to future student progress and trigger student disengagement; hence there is value in examining the strategies employed by staff to mitigate these risks. Ten such strategies were described earlier and further discussion of the most widely reported is presented below, although effectiveness of each was not evaluated as part of this study.

Research skill development is likely to be more effective if introduced incrementally and early in a degree programme prior to highly specialised content and independent inquiry-based project work (Bourner, Heath and Rospigliosi, 2014; Willison, 2012). Such a scaffolded approach to teaching and applying appropriate styles is reinforced by the findings in this study, as is the use of a mix of teaching styles and methods to avoid student engagement problems (see Wimpenny and Savin-Baden, 2013). The practicality of tasks should be thoroughly investigated by teachers before implementation in order to reduce the risks of time-wasting, technology failure and problems arising from large class-sizes. Barnett (2012) recognised the importance of pedagogic variety within the student experience, whilst urging teachers to move beyond such considerations towards a higher risk pedagogy that offers a curriculum of educational transformation at the center.

Staff interviewed felt that departments (and institutions) should be more supportive of innovative research-informed student engagements e.g. competitions, poster exhibitions etc. Such inclusive activities are more likely to encourage closer integration of teaching and research within communities of practice in their disciplines (Brew, 2012), potentially enabling risks to be better shared, understood and co-managed. Institutional teaching priorities, for example, published strategies promoting the use of research-informed teaching, must also be supported by institutional policies and processes, enabling flexible teaching practices, and even innovative risk-taking, to ensure new initiatives are encouraged in appropriate time frames. At a departmental level, staff in this study reported writing flexible teaching documents, such as module records, as a particular strategy to facilitate the introduction of RiT. However, this can also cause its own problems.

Barnett (2014: 44) noted ‘flexibility and openness present a situation of some risk to students.’ Therefore, adopting a flexible document strategy may also mean that additional student support or guidance needs to be considered, to avoid generating stress or confusion.

Any successful or innovative teaching approach should be shared between colleagues at local (departmental) level as a means of encouraging the integration between teaching and research within a discipline (Spronken-Smith *et al*, 2011). Mentors and experts in specific practices could also be identified and supported. Such a network might also counter the extent of intra-disciplinary variation that might exist in teaching practices, and minimise the fear of unexpected outcomes to research-based activities that may occur in some individuals. A number of staff strategies identified from this study support, and strengthen, those proposed by Spronken-Smith *et al* (2011) specifically for countering challenges of an inquiry-based learning mode. These include flexible but clear activities and assessment criteria, a reflexive approach to programme planning, and promoting and sharing good practice. The similarities of the two sets of strategies suggest they may be broadly applicable across multiple modes of RiT.

Risk management as an approach to enhancing RiT

The risk management approach advocated here may be more effective if applied to the full range of teaching activities rather than just those perceived as more innovative or risky. For example, traditional (didactic) teaching styles may also carry intrinsic risks such as surface learning (Zepke, Leach and Butler, 2014), student disengagement and inadequate preparation for employment or further study (Levy and Petrusis, 2012). A risk management approach could reveal new insights into established or perhaps previously unquestioned practice. However, an approach to tackle the potential risks of RiT could be interpreted by a risk-adverse higher education system as an argument against innovation. Hack (2012) claimed that project supervisors often avoid student research projects that require ethical approval, even when considered low risk. Emeritus Professor at the University of Gloucestershire, Mick Healey (pers. com, 2012), remarked ‘we are already seeing some departments not allowing students to interview members of the public on the basis of institutional risk sometimes dressed up as ethical risks’. Healey, Jenkins and Lea (2014) also noted that some higher education staff (especially those based in colleges rather than universities) feel constrained by an ethos reminiscent of Ofsted school inspections, with very prescriptive measurements of success, leading them to adopt a more risk averse approach to trying out

new learning methods.

Risk management in the current context can be seen as a framework to identify and categorise likely risks (barriers, issues and concerns) that might be encountered by teaching staff wishing to put new ideas into practice. Bloxham and Carver (2014) questioned the lack of useful examples in the literature that illustrate additional challenges faced by academics where pedagogic innovations are introduced. The mitigating strategies described by staff in this study may therefore help others to recognise what can happen when undertaking RiT, contributing towards better programme or module planning.

This study did not investigate any risks of *not* doing RiT and this would benefit from further exploration. If we accept Barnett's (2012) 'uncertain world' example, then the ability to be comfortable with uncertainty could enhance a student's employment prospects. A lack of exposure to such challenging teaching methods could lead to some students being ill-prepared to cope with life beyond university, leading to a potentially stressful transition to professional practice (Taylor and Canfield, 2007).

By using the language of 'opportunity' when describing or encountering risks, it is proposed that the risk framework can be interpreted in a more positive way rather than acting as a disincentive to academics wanting to try out new ideas. Such opportunities could be further embedded into practice by incorporating the risk management framework within a more widely understood 'appreciative inquiry' approach (Cooperrider and Whitney, 2005); for example, by focusing on what can be achieved by addressing risk rather than what could happen if it is not explored, or by using risk management as a means of smoothing the way for implementing change.

Conclusions

By applying the risk framework identified in Gresty *et al.* (2013) it has been possible to address the three questions originally posed at the start of this empirical study. A risk management approach can facilitate the implementation of RiT by enabling staff to identify which factors may impact on students and staff when utilising the RiT delivery method. The results of this study confirmed that a number of potential risks previously identified in the literature do indeed exist in practice for multiple disciplines. In particular, the risk management approach employed allowed two key risk categories to be identified as having a significant impact on student learning: curriculum bias and how research engagement impacts on student experience. Identifying risk factors allows the associated impact to be assessed and a range of

mitigating strategies can then be adopted where necessary, creating new opportunities for strengthening RiT.

Strategies commonly adopted by staff to reduce risks in this multidisciplinary study included the use of varied teaching styles, raising awareness of what RiT involves (with staff and other colleagues), and encouraging a wider RiT ethos or culture. Future research should focus on evaluating the use of such strategies to identify which are more effective (for example, with regards to reducing student disengagement) and if there is a specific sequence of events or activities to maximise beneficial impact. Additional research in this area would also help to address Willison's (2012) call that studies across entire degree programmes to assess skill development are still needed, to confirm the effectiveness of the early introduction of research skill-building opportunities into courses.

In June 2015 the funding bodies for higher education in England, Wales and Northern Ireland launched a consultation for a new approach to quality assessment, with the UK Government also committing to the introduction of a Teaching Excellence Framework (TEF) in England (HEFCE, 2015; Morgan 2015). This has already caused some academics to express concern, querying whether a TEF might reward 'a safe, conservative approach to teaching over bolder, risk-taking methods' (Jones, 2015). The benefit of managed risk, to allow students to experience uncertainty and develop associated skills, is something that should be factored into higher education teaching. This study has provided evidence of how staff and students from several disciplines view RiT from a risk perspective, with both positive and negative outcomes. As Schulman (2005: 1) noted 'I would say that without a certain amount of anxiety and risk, there's a limit to how much learning occurs.' In terms of the impact on students' learning, more can be gained by embracing the risks and uncertainties associated with RiT than by strategically avoiding this type of activity.

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