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# THE DESIGN AND DEVELOPMENT OF AN INSTITUTIONAL DIGITAL TOOLKIT TO ENHANCE RESEARCH TEACHING INTEGRATION

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## Abstract

A research-teaching nexus (RTN) involves integrating research and teaching, with the benefits being increasingly recognised by universities. There exists a myriad of contextual factors that impact successful RTN integration. This is further complicated as many RTN models and frameworks are theoretical, lacking empirical evidence, or practical pedagogic support tools [1- 4]. Those models and frameworks which are practical e.g., Connected Learning at University College London [5] tend to be customised to the institution(s) where they are used. Consequently, this paper reports on how a survey study conducted at Ulster University helped to understand the perception and practice of academics at Ulster, identifying limitations, challenges and conceptual misunderstandings. This analysis led to the development of a practical RTN toolkit, emphasising the opportunities for active and enquiry-based learning, the resulting RTN benefits for students' skills development, and practical suggestions for how academics (specifically early career academics) can achieve this research teaching integration. This became the basis of the design and development of a customised digital toolkit, responding to the gap in RTN practical pedagogic support for academics. This toolkit is now freely available online as an interactive PDF [6]. It provides more practical information, expanding primarily upon Healey's types of RTN [7], and has been informed and customised by studying the literature, survey findings (from Ulster academics), and case studies collected at Ulster University. The toolkit identifies RTN Activities, that are organised along a spectrum of passive-to-active student engagement, the RTN Competencies that can be developed amongst students by engaging in these activities, and a series of RTN Checklists to design and inspire RTN decision making. This toolkit has been piloted with academics from a range of disciplines with positive feedback. Early findings confirm that, for even experienced academics, it has helped to clarify conceptual understanding and led to new ideas for strengthening research teaching integration. This research contributes to the knowledge base on RTNs, providing a practical RTN case study at a large university, which is of relevance to universities with vested interests in strengthening the impact of research teaching integration for both academics and students.

Keywords: Research teaching nexus, digital toolkit, higher education, survey, pedagogy.

## 1 INTRODUCTION

A research-teaching nexus (RTN) involves integrating research and teaching [8]. Many universities are now utilising an RTN approach, having acknowledged the importance and benefits of integrating research and teaching, to actively engage undergraduate and postgraduate students in research skills, including developing closer relationships with academic research staff [1] [9] [10][11]. The nexus enables students to develop competencies required for the 21st century [12][13]. However, many universities can fail to successfully implement an RTN across all years of study of undergraduate degrees, in contrast to postgraduate studies, and fail to provide the relevant practical support in respect to approaches and activities, good practice, or for promotion of an RTN culture [1] [14].

The challenge of a successful RTN integration is especially apparent in higher education institutions where research is closely linked to enterprise and innovation, and where research is the predominant activity, as opposed to teaching, in respect to inter alia, staff performance and funding [15]. There also exists two opposing beliefs, one where undergraduates are ill-prepared for research, and one where undergraduates should gradually develop research competencies over time. This is in respect to the importance of an RTN, the strength of the relationship between research and teaching, and the level at which it should be integrated into higher education [1] [16] [9][11]. Student learning and development through an RTN applied over each year of study is highly dynamic, with variable outcomes from student-to-student, because of a myriad of student, staff, environmental, institutional, and situational contextual factors [15][1][9]. It was found in the literature that decision-making on an RTN, in the face of many contextual factors, can have a profound impact on undergraduate students, their learning, development, and success, including potentially in life, society, employability, and contributing to the economy [1][10][17]. Decisions can also have an impact on staff who operate within complex and dynamic work

environments and with competing priorities, including in respect to time and workload, and meeting performance requirements [18] [9].

It is apparent that many existing RTN models (e.g., Boyer's Four Scholarships, Healey's Curriculum Design, and the Student Research Lifecycle) are theoretical, and lack a foundation of any substantial empirical evidence, and practical examples, tools, and guidance [1] [2][4][19]. However, there are now practical models and initiatives available (e.g., Connected Learning at University College London) [20], but they tend to be heavily applied and orientated towards the universities where they are utilised, because of the variety of contextual factors e.g., course design and institutional and staff perceptions. Thus, highlighting the fact that designing and developing RTN support methods, tools and guidance requires knowledge and understanding of the nexus at the specific university, and of the experiences of academics, where the support will be provided. Consequently, this paper reports on a study of institutional practice with data gathered from a survey and institutional policies. The results pertain to staff perceptions of the RTN. RTN activities are then discussed with consideration for existing theories and models.

Ulster University is one such higher education institution that has recognised the importance of a RTN and has specified the integration of research and teaching as a key principle [7], focusing on the use of Healey et al.'s four types of RTN [2]. The authors of this paper went on to design and develop a digital RTN toolkit to provide practical pedagogic support to academic staff members, from different faculties. Thus, there was a need to better understand the existing nature of the RTN at Ulster University, from the perspective of the academic staff who actively engage in teaching and research. Staff at Ulster University were therefore, surveyed based on their experiences, opinions, and beliefs on an RTN.

The survey gathered qualitative and quantitative data which provided exploratory insights from the unique individual perspectives of a range of academic staff. The findings contributed to understanding the nature of RTNs in higher education, and the experiences, approaches and activities used to develop a nexus. The findings helped inform the design of an RTN toolkit, enabling the toolkit to be customised to the university, and academic staff expected to use it, assisting with more effective decision-making in delivering an RTN. Consequently, promoting a culture of research and teaching integration, and enriching student learning which is dependent on the outcomes of such decisions. Further work is discussed, specifically, relating to the design and the initial evaluation of the RTN toolkit by analysing user feedback from focus groups. The impact of this research is also a contribution to the wider body of knowledge to higher education institutions worldwide, as "linking teaching and research in higher education is a goal of many academic institutions" [21].

## **1.1 Research Questions**

We were interested to find out:

- What are the different approaches to an RTN, and how important do educators perceive these different approaches to be?
- What activities are commonly used to integrate teaching and research responsibilities?
- What are the perceived benefits and drawbacks of integrating research and teaching?
- What advice would academics give in respect to an RTN and how we could incorporate this into a RTN Toolkit

## **2 METHODOLOGY**

### **2.1 Research Approach**

The survey and focus groups data included demographics, and qualitative data on academic staff experiences, opinions, and beliefs in respect of an RTN at Ulster University, with reference to Healey's four types of RTN [2], as promoted by Ulster University [7]. The research project was approved by an Ulster University ethics filter committee.

Qualitative methods were used to elicit insight into the participants' experience of RTNs and the developing Toolkit [22]. Jisc Online Surveys was used as the survey delivery tool. The survey questions were relatable to the research-teaching experiences that participants would encounter. The questions were not excessive to encourage completion, moreover, they were designed so that the participant could easily interpret and complete the survey [23]. The question themes and topics were focused on RTN experience, opinions, and beliefs, and aspects of toolkit design and development. Five-point Likert scales [24] were used to ensure measurement consistency. Several open-ended questions were also provided to enable further insight from the unique perspectives of participants.

## 2.2 Participant Sample

As argued by Winlow [22], having reviewed Breen [25], in an educational context, a purposeful sample of participants who have been exposed to similar education-related experiences, is required. Therefore, the participant sample (n=49) was composed of Ulster University academic staff with experience in teaching and/or research. Whilst Ahmad [26] and Nulty [27] discuss the importance of survey response rate the goal of the survey in this context is to explore the lived experiences of academics with perspectives from different disciplines. Focus Groups were drawn from targeted groups of experienced educators (n=10) and newer academics (n=4) in order to provide a range of perspectives.

## 2.3 Data Analysis

The analysis of survey data was conducted using Microsoft Excel (version 2201). The demographic/multiple-choice data was totalled and sorted into groupings based on gender, age, and RTN preference. Negative (1 and 2-point responses), neutral (3-point), and positive (4 and 5 points) rating scales were used. Open-ended questions and focus group responses were loosely coded to identify common themes [28].

# 3 RESULTS

In this section we report and discuss some results from our data analysis and how these informed our decisions and development of the RTN Toolkit.

## 3.1 Demographic Analysis

The total number of participants in the survey was 49 comprising of 23 (47%) females and 26 (53%) males. The most common age group was 46 – 50 years old (20%). The most common group for years of experience in higher education was 11 – 15 (n = 10, 20%), and 21 – 15 years (n = 10, 20%). The most common highest degree is PhD/ EdD (n = 42, 86%). Survey participants' area of expertise was wide-ranging with 16 areas. Subjects allied to medicine/nursing was the most common area of expertise (n = 15, 31%). Focus Groups were drawn from targeted groups of experienced educators (n=10) and newer academics (n=4).

## 3.2 Valuing the Importance of a RTN

Most academics responded as having a teaching-heavy workload (54%). It was found that these academics are the least likely to have successfully aligned and integrated an RTN. In contrast, academics who reported an equal research-teaching balance, appear to be in the optimal position, as they are most likely to have successfully created their RTN. There was a bias in the sample towards male academics identifying as having a research-heavy balance of work (86%), compared with 50% male-female for those with an equal balance, and a slight bias towards females for those who responded as having a teaching-heavy responsibility (54%). This pattern may echo the findings [29] that *“indicated that women generally feel that men access status and indicators of esteem more easily than they do”*.

Interestingly, in total, 78% of the sample perceived that their research and teaching is 'well-aligned/very well-aligned', which is therefore, a positive response in respect to nexus integration at Ulster University. As this is representative of only a small sample, we cannot infer that the situation is positive on a larger scale. It was found that academics' belief in the importance of an RTN is proportional to how well aligned and integrated their actual RTN is. Those with a high belief were the most likely to have a highly aligned and integrated RTN. Therefore, a high belief in the importance of

an RTN amongst academic staff represents an additional factor to research-teaching work balance in establishing optimal conditions towards more successful alignment according to the exploratory results. The belief in the importance of each approach appears to also be proportional to the rate of usage of each approach.

**What are the perceived benefits and drawbacks of integrating research and teaching?**

A wide range of RTN benefits were found and sorted into themes (Table 1). For example, the most common benefit was transferable competencies (45%). When asked about RTN drawbacks and barriers, time and workload were the most common (48%).

Table 1. RTN benefits sorted thematically.

<i>RTN Benefits</i>	<i>n</i>	<i>% of those who responded</i>
Transferable competencies	10	45%
Authenticity, real world value, relevance, and credibility including working with practitioners	7	33%
Student engagement and voice	3	14%
Student and staff interest and inspire future researchers	3	14%
Underpins course content	2	9%
Relate course theory to practice	2	9%
Independence and self-learning	2	9%
More vibrant inquiry-based approaches	2	9%
Research more accessible to students with less of a divide	2	9%
Direct experience of latest research methods and practice	2	9%
Allows students to understand the impact that research can have on their field of study	1	5%
Development of new research and consultancy projects	1	5%
Beneficial to staff as explaining research must be clear and specific	1	5%
Creates a culture of research which will help start to change practice	1	5%
Increased understanding of knowledge development	1	5%
Build up a portfolio of cases, problems, and exercises that electrify the classroom	1	5%
Give students unique experiences which enhance their professional profile	1	5%
Helps us to truly evaluate our pedagogical practice	1	5%

**3.3 Understanding and Application of RTN Approaches to Educational Practices**

Survey participants were asked to report how often they use several approaches in an RTN using these definitions (Table 2):

*A research-orientated approach involves developing students’ research skills and techniques; research-based involves students being actively engaged in carrying out their own research; research-tutored involves interactive activities such as group discussion of a paper; and research-led involves modules and curriculum design directly reflecting the research interests of the school such as lectures [2]*

A research-orientated approach’ is utilised the most frequently (n = 35, 71%) with participants rating it as being also the most important for students to engage (n = 42, 86%).

Table 2. Participant Self-Reporting of Use and Importance of RTN Approaches.

	<i>Frequency of Use (High to Low)</i>	<i>Importance for engaging students (High to Low)</i>
Research-orientated	71%	86%
Research-based	65%	82%
Research-tutored	47%	71%
Research-led	43%	57%

### 3.3.1 What activities are commonly used to integrate teaching and research responsibilities?

When participants were asked to rate how often they integrated RTN activities (Figure 1) it became apparent that there were misunderstandings of the terms being used and how they related to actual RTN activities. In the survey 'promoting academic referencing' is the most common activity (94%) followed by asking students to tackle a research problem in their final year project/dissertation (86%).

Teaching activities categorised as research-led, tutored, and orientated appear to be quite common amongst the surveyed academics. In these, students are predominantly 'listening' about, 'observing', 'exploring', and 'trying' to do teacher-dependent, research-related activities.

Although participants reported high usage of 'Research-based' approaches (Table 2), this was less apparent in the range of activities they utilised (Figure 1). Respondents indicated that teaching activities which fall under research-based, are not frequently provided. These include those where students are predominantly 'doing' independent research, 'owning' their research, or undertaking research as partners, and 'projecting' their identity as researchers. For example, opportunity for students to attend a conference (12%), including students in research ideas (student-staff partnerships) (20%), and co-authoring and publishing with students (20%), and recruitment of students for research experiments (29%).

Interestingly, overall, the responses, in respect to activities, do not appear to fully reflect the percentage of academics who use each nexus approach given the inflation of the research-based approach and greater response for final year as discussed, and prevalence of research-led, tutored, and orientated associated activities. Thus, highlighting potential misinterpretation of the meaning, level-applicability, scope, and importance of the approaches. This assumption was confirmed by one academic's response who noted that they use research-led, and research-orientated approaches already, but had difficulty recognising the importance and relevance of research-tutored or based approaches; another academic considered that researched-based and tutored approaches lack value in comparison to research-led and orientated approaches, arguing that they are much richer experiences for students.

Undergraduate students are in fact, widely known to think highly of research [10]. However, the year group where an RTN has been integrated the most is the undergraduate final year. As a result, there appears to be a lesser focus on the undergraduate RTN with decreasing level of study, or a lack of awareness of approaches and methods in use, that may be RTN related. This was found in the literature, to be detrimental to undergraduate development, highlighting a need to raise awareness of the value of embedding a nexus at all levels of undergraduate degrees through to postgraduate level [1][10][15]. Specifically, RTNs have been integrated in undergraduate year 1 the least, highlighting the opportunity to increase the amount of RTN at this level.

### How often RTN activities are provided

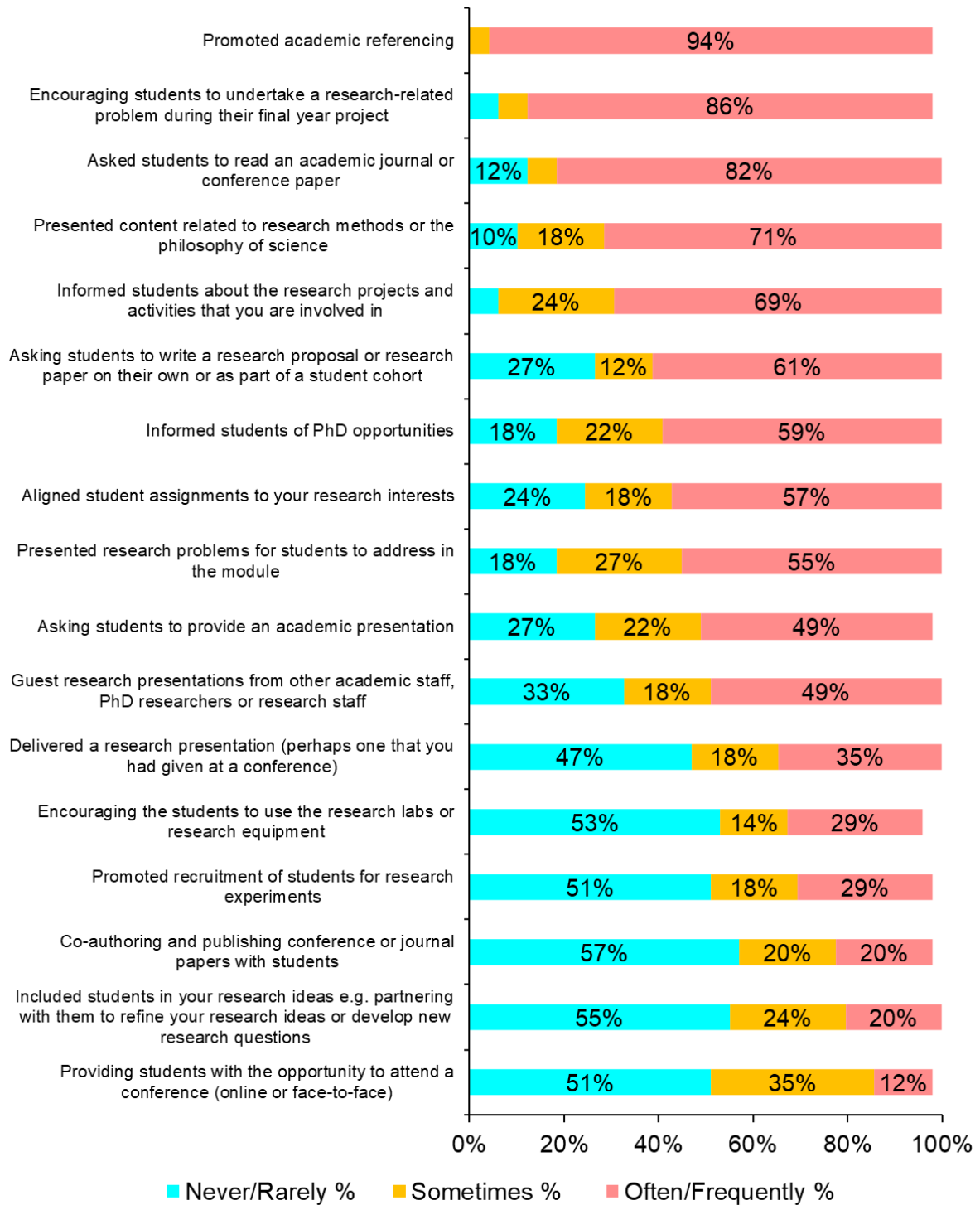


Figure 1. How often RTN activities are provided.

### 3.4 What advice would academics give in respect to an RTN?

Participants provided advice for early career academics in respect to RTNs. These responses were thematically summarised in Table 3.

Table 3. One piece of advice that participants would give to an early career academic who is trying to develop a research-teaching nexus.

<i>RTN Advice</i>
<ul style="list-style-type: none"> <li>• Need to manage the expectations of students and teach in a balanced way</li> <li>• Do not simply teach based on your own personal research expertise but fairly reflect the work of others in the discipline</li> <li>• Stay motivated, reflect, learn, and adapt, and listen to student feedback, learn with students</li> <li>• Manage time for your own research, you don't need to do everything</li> <li>• Involve yourself with excellent research you have a passion for, and think about how you can include it in teaching</li> <li>• Keep up to date with education research, and don't be afraid to try new approaches and activities</li> <li>• Keep reading what is new in your field, become an expert, and update courses including reading lists</li> <li>• Collaborate with other colleagues and early-stage researchers, developing teamwork and sharing</li> <li>• Help stimulate the next generation of PhD researchers through your teaching</li> <li>• Engage students in critical thinking including what it means to think critically and ask questions</li> <li>• Ensure relevance to learners and required learning outcomes, including development of competencies</li> <li>• Include authentic and interesting examples and applicability in real practice</li> <li>• Keep research and teaching closely aligned, think about the steps, and keep it simple and clear</li> <li>• Be open to new ideas, and be aware of alternative options for including research in teaching</li> </ul>

Academics at Ulster already appear to actively engage in a range of activities, e.g., they 'often/very often' make use of pedagogic research to inform practice (57%), that should be nexus-informing, highlighting the potential to foster a nexus culture, when customised support is provided via a digital RTN toolkit. Responses highlighted, the features or content ideas academics would like to see the most in a toolkit included for example, case studies and practical examples (38%), practical suggestions and examples of good practice (25% of those who responded), and activity instructions (13% of those who responded). Other notable features or content included for example, frameworks, assessment templates, tools, and methods for converting research into active learning activities, recommendations for interdisciplinary teaching partnerships, and information on how to publish with, and include students in grant applications. Such content would emphasise and promote the identified benefits and help counter the identified barriers to successful RTN integration. As a result, a conceptual roadmap was produced as shown in Figure 2. and used to develop the Toolkit [6].

### 3.5 Focus Groups

Focus groups (n=14) were held to get early evaluative feedback. Participants highlighted how the Toolkit had developed their understanding of RTN and specifically had provided a range of useful tools to support their further development of activities and approaches to use in their teaching.

*"It showed the diversity of approaches - particularly that it was not just about using your own research and incorporating that in to teaching - but to encourage students to undertake "real" research."*

*"Toolkit will be very helpful in revalidation process"*

*"The detailed list of competencies and the suggestions on how these can be developed are extremely valuable"*

Participants indicated that the Toolkit would be strengthened through the inclusion of further case studies, the aim of the project team is to build these up over a period of time.



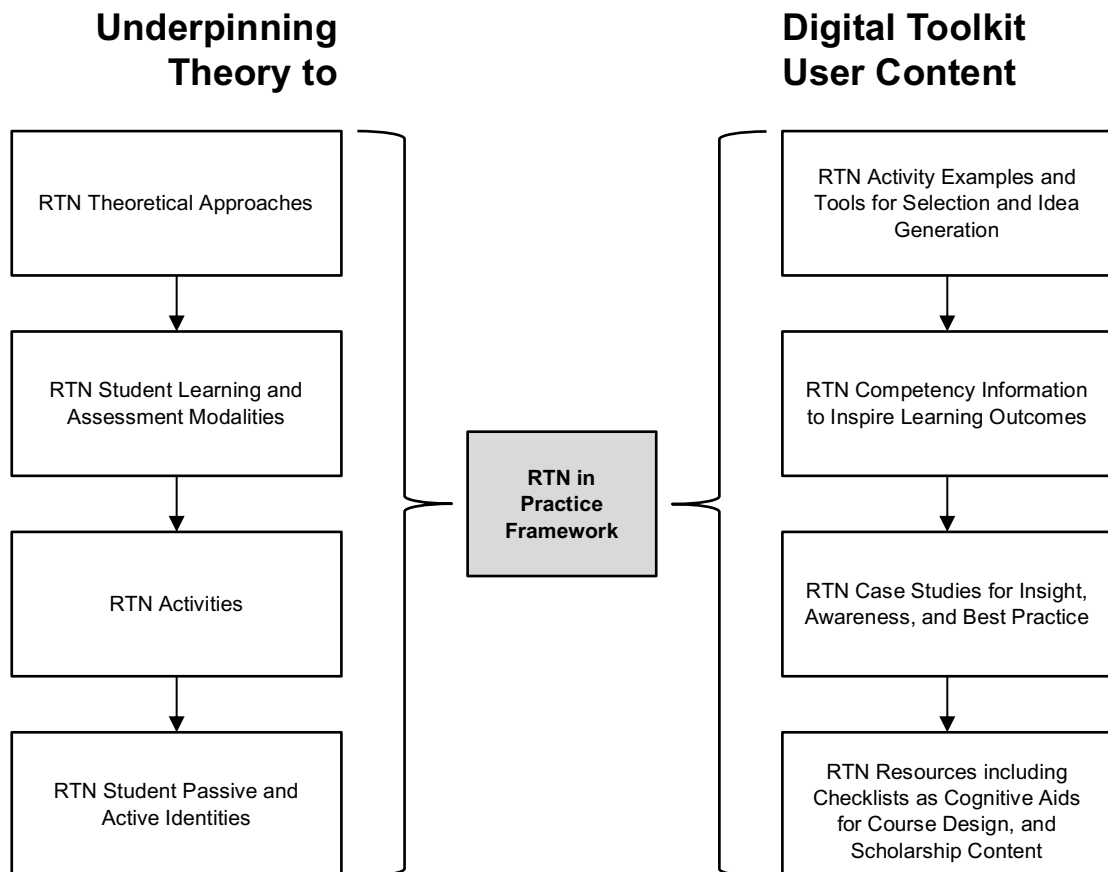


Figure 2. RTN digital toolkit conceptual roadmap.

#### 4 CONCLUSIONS

Firstly, even though research and teaching integration appears to be predominantly positive, it was clear that focusing on either research or teaching can be detrimental to the other, requiring a workable balance to be struck and supported by the university.

Secondly, there is a need to promote a positive nexus culture, and encourage belief in the importance of a nexus, enhancing integration through improved motivation amongst academic staff. This includes communicating the importance and applicability of each specific RTN approach, to further enhance the belief in each approach amongst academics, and to differentiate and reinforce the importance of the research-based (active) activities where students are partnering, owning, and projecting their research and teaching identity. This includes using more authentic activities and resources, in comparison to the research-led (most rote/passive). There needs to be more emphasis and customised guidance on utilising RTN approaches and activities, that are suitable for all levels of undergraduate programmes, moving beyond simply using a final year project as a research-based activity. This confirmed the need for a RTN toolkit to fill these gaps in pedagogic support.

Subsequently the digital RTN toolkit has been designed around the format preferences, features, content, and activities put forward by academics. Furthermore, the impact of identified drawbacks such as workload and time constraints must be mitigated through providing a wide choice of suitable nexus approaches and activities, decision-support aids, and resources. Likewise, the benefits such as potential competencies, student engagement and voice, authenticity, and interest have been reflected in the toolkit to enhance staff motivation, encourage a culture of integration, and reinforce positive student learning and assessment experiences.

Due to the importance of the toolkit being fit-for-purpose for the context, and the criticality of decision-making in respect to student learning and assessment experiences and outcomes, the toolkit must be evaluated by the teaching staff who are intended to use it. Early feedback has provided positive feedback and suggestions for enhancement. Ongoing active insight on the impact of the toolkit and changes in

respect to RTNs in practice and institution wide, will contribute to addressing the limited practical insights in the literature.

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