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Person, context and judgement: Exploring the potential of a theoretical model describing the role of information and communication technology in the doctoral research process

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This paper presents an early exploration of the utility of a theoretical model of internal and external factors that influence and determine relationships between doctoral researchers and information and communication technologies (ICTs). We discuss feedback gathered from three iterations of a voluntary, online, open programme called 23 Things International to illustrate how the components of the model emerge through participants' reported experiences of the programme; a key is understanding how context-dependent uptake of specific ICTs can be closely connected to whether participants can relate materials directly to their own situation. Although further investigation of the model is warranted, there are indications that it will be useful for guiding not only improvements to future iterations of 23 Things International, but also for designing, developing and implementing learning environments that meet the needs of participants from a variety of (doctoral research) settings. It will also help those responsible for providing such support to understand the varied responses doctoral researchers may have to professional development programmes and support.

Implications for practice or policy
- The model provides insights into factors that influence and determine learner response to incorporating ICTs within doctoral research processes.
- Examples and discussion of learner responses to doctoral research ICT-focused professional development programmes are useful to course designers.
- Course design should enable learners to translate ideas into meaningful thinking and practice within their own research contexts.
- Improvement to the model's applicability requires systematic analysis of its components using a relevant test base (i.e., 23 Things International).

Keywords: doctoral researcher development, researcher development programmes, ICT use, research, digital technologies

Introduction

In this paper, we discuss the application of a theoretical model that was one of the outcomes of earlier studies (Sim et al., 2020; Sim & Stein, 2019a, 2019b). It is thus, as well as generating useful insights about the 23 Things International programme, an exploration of the usefulness of the model for providing insight and guidance into how, in practical terms, we can create environments for professional learning and development that encourage doctoral students to (re)conceptualise their information and communication technology (ICT) views and practices within their research and study contexts. Examples of papers with similar objectives and approaches in the literature include Green et al. (2007), Dettmers et al. (2011), Gizir (2019) and Werang and Leba (2022).

Background

In looking at the literature, we identified three broad areas that would be of relevance to this exploration.

Research into doctoral study and supervision

Over the past few years, doctoral supervision and the role, place and nature of the doctorate have received increasing attention in higher education research literature. A wide range of topics have been covered, including the importance and types of support for students as they make their way through candidature (e.g., Dowle, 2023; Jairam & Kahl, 2012; Zhou & Okahana, 2019); personal issues that doctoral students face related to well-being and coping (e.g., Cohen, 2011; Janta et al., 2014); teaching aspects of doctoral supervision (e.g., Cotterall, 2011; McAlpine & Norton, 2006); experiences of being a doctoral student (e.g., Pitcher, 2010; Vekkaila et al., 2013; Willis & Carmichael, 2011); and student-reported material concerning the framing of large research projects for doctoral investigation (e.g., Berman, 2013). In addition, there are many guides for students (amongst a plethora of related topics) about how to go about research, what it means to undertake a research project the size of a doctorate; coping, resilience and well-being techniques; and practical project management strategies (e.g., Denholm & Evans, 2006; Denicolo et al., 2018; Thomson & Walker, 2010). For supervisors, there is a similar range of topics and advice, the majority focusing on the interrelationships among supervision, research, projects, students and institutions and about connections between the supervision research context and the broader context of academia, and practice (e.g., Åkerlind & McAlpine, 2017; Bitchener et al., 2011; Denicolo et al., 2019; Hutchings, 2017; Kiley & Mullins, 2005; Lee, 2008; Salinas-Perez et al., 2019).

Research into supportive and well-planned ICT environments

With the advancements in, accessibility to and development of, ICT within education settings has come a plethora of research into online and blended learning. Ako Aotearoa (a New Zealand government-funded organisation committed to supporting the country's tertiary sector teachers, trainers and educators) has supported many projects that have investigated related topics including online learning, e-learning, flexible and distance learning. These projects include those that have a system-wide focus (e.g., Marshall, 2012; Marshall & Shepherd, 2016) as well as those with overarching guidance for e-learning development and use, such as the *eLearning Guidelines* (Ako Aotearoa New Zealand, TeLRG & New Zealand Tertiary College (n.d.)); to others that address student learning in a more focused way (e.g., Heinrich & McDonald, 2018; Jeffrey et al., 2009), and projects that have explored support for staff teaching in flexible and blended learning environments (e.g., Nichols et al., 2014).

Research into ICT use and study

Taking a more focused look at specific skills used by students when they engage in study, there are, once again, many documented examples of research and practice that paint a picture of developments. There are studies on student use of ICT, though not necessarily doctoral students, and these cover a wide range of topics, including specific ICT skills (e.g., Oliver, 2011; Stensaker et al., 2007). Where postgraduate research students are concerned, some studies on ICT skill development and support provide some insights (e.g., Dowling & Wilson, 2017). An example by Aghaee et al. (2016) considered ICT systems within institutions and the gaps in interaction with PhD students. They highlighted that such systems can be improved to enhance interactions rather than cause barriers to communication. In addition to these three broad areas, we have more specifically relied on literature around course design and structure – concepts of scaffolding. In online programmes, how much support and direction are enough, or too much, versus the freedom to navigate content in a way most convenient for the user? There is a well-established literature on scaffolding approaches, which can be particularly useful for problem-based learning and for students beginning to tackle difficult material (e.g., Bliss et al., 1996; Greening, 1998; Hogan & Pressley, 1997). More recently, there has been revived interest in how the very adaptable affordances of online courses can create new modes of navigation (Sharma & Hannafin, 2007; Doo, Bonk & Heo, 2020; Maun, Lawrie & Wright, 2020; Alvarez, Jivet, Pérez-Sanagustin, Scheffel, & Verbert (2022).

The current study

These bases (viz. literature about the nature of supervision and doctoral study; ICT in tertiary teaching and learning settings; and ICT use by students as part of research processes) provided the context of earlier investigations by two of us. The aim of those studies (Sim & Stein, 2019a, 2019b) was to bring to light perceptions about ICT and doctoral research practices held by higher degree research supervisors and students. The intention was to glean insights to inform the content and scope of professional development programmes facilitating staff and students to make the best use of ICT within doctoral research processes. Out of that study, four types of relationship between the person and ICT were identified:

  (1) Relationship 1: ICTs and people are perceived as separate and separated entities. ICTs are impartial tools. It does not matter how ICTs are used because the end point, that is, thesis completion, is the justification.
  (2) Relationship 2: ICTs and individuals work alongside each other. ICTs are tools or mechanisms that prompt active thought on practices with respect to planning and managing thesis writing and project execution.
  (3) Relationship 3: ICTs and the person are in a complementary relationship. Knowing about ICTs is only part of the thinking. What is more important is getting the "flow" right.
  (4) Relationship 4: ICTs and the person are intricately linked through multiple active, practical, goal-oriented connections. ICTs are not neutral. There is a two-way interaction between technologies as artefacts and the use of them to achieve ends.

In addition, a theoretical model was developed to describe internal and external human and contextual factors that have an influencing and determining impact on the perceptions (and resultant behaviours) that doctoral students hold about ICT and their research study work. The model appears in Figure 1.
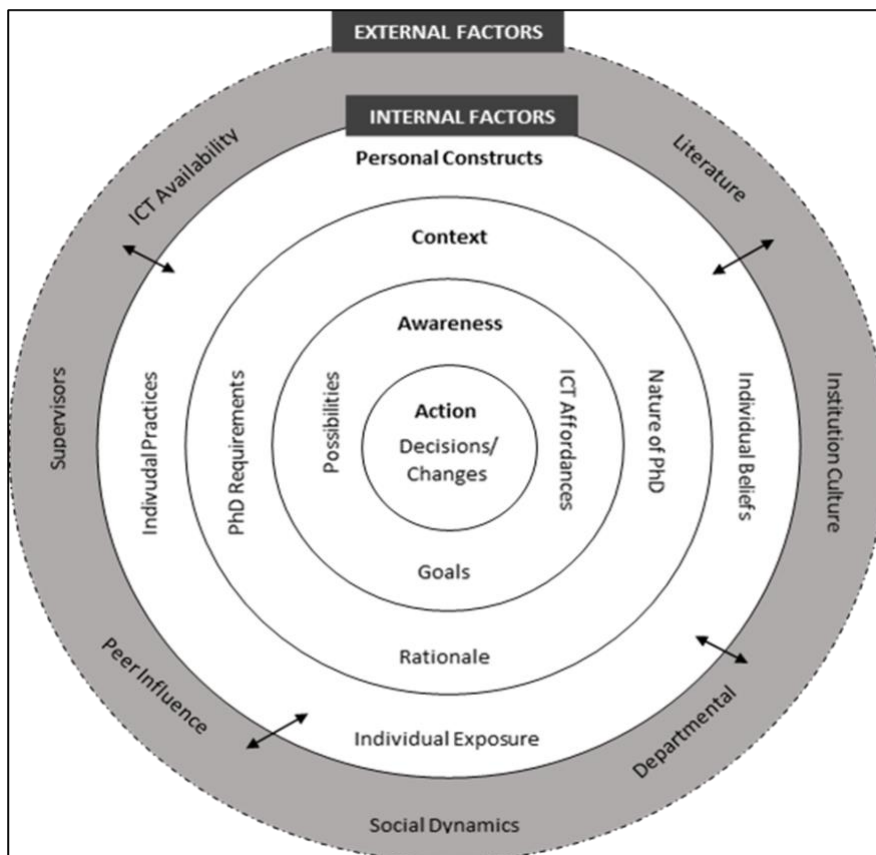

Figure 1. A theoretical model to describe factors influencing and determining relationships between ICT and the person (Sim & Stein, 2019a, p. 11)

The model draws in part on Bronfenbrenner's (1979) models of ecological systems, framing interconnections between and among the individual and the systems and subsystems within which that individual exists and grows. The central point of the model in Figure 1 concerns a person's actions, decisions and judgements about ICT use. These are the result of person-factors related to the influences of the context the research students find themselves in (institutional, discipline PhD rules and requirements), such as prior knowledge and experience related to thought, belief and practice. These beliefs and practices (shown in the Personal Constructs section of Figure 1) are situated within, and reflective of, elements external to the person. They are associated with social dynamics, major ideas in wider literature and trends and the norms and expectations of discipline, institutional context and doctoral supervisors (included as part of the external factors in Figure 1). The model thus helps to map the dynamics that contribute to observable individual action and decision-making.

It should be pointed out that this model is not an ICT acceptance or adoption model of the kind that has been in existence since the early 1970s. One such model, the concerns-based adoption model (Hall, 1974), comprises three dimensions of innovation adoption, two of which describe and explain observable actions and behaviours (levels of use and stages of concern) and a third which focuses on the diagnosis of those behaviours and actions (innovation configuration). This staged model has been found to be useful in educational institutional settings as it makes links between user systems and resources systems. Another model, the technology acceptance model (Davis, 1989), highlights an individual's acceptance of ICT. Perceived usefulness and perceived ease of use are the two variables that this model uses as a basis to describe and determine acceptance. A third well-documented acceptance and use model is the unified theory of acceptance and use of technology (UTAUT) model (Venkatesh et al., 2003). The UTAUT was developed through analysis of eight existing models. Like the first two models described above, it, too, focuses on intention and behaviour related to the adoption and use of information technology, but unlike those previous models, it takes cognisance of the dynamic influences of organisational context, user experience and demographic characteristics.

The theoretical model in Figure 1 also focuses on person, ICT and context connections, but in contrast to the concerns-based adoption model (Hall, 1974) and the technology acceptance model (Davis, 1989), it pays specific attention to the possibilities of how doctoral students (and supervisors) adapt and enact their ICT selves within the doctoral education context. It focuses attention on the many factors external and internal to the individual that may be influencing and determining that individual's perceptions about ICT. Although there is potential for further work to be done on examining how our model may benefit from the UTAUT (Venkatesh et al., 2003), our model is not about technology acceptance or adoption, nor is it a staged model that diagnoses behaviours. Instead, it explores relationships between ICT and the person within the context, including an individual's related judgements and actions.

Testing the model

The opportunity to explore the usefulness of our model in practice arose through our involvement with a programme for doctoral students and supervisors called 23 Things International (https://www.23thingsinternational.com/) through the participants' views of their experiences of the programme. We used the components within the model, along with the person-ICT relationships described in the previous section, to provide the lens through which to consider the impact 23 Things International may have had and is having on the participants' views about the use, worth and place of ICT within research practice. This programme, described in more detail below, provided the context for the exploration of the model.

In the following sections, we also provide an overview of the sources of data we used across the 2020–2022 iterations of the programme to monitor its success. We then discuss the evidence by presenting participants' expression of their views linked to the theoretical model and to four ICT-person relationships, where appropriate. In this way, the discussion also explains and describes the model further and offers a critique of its applicability for practice. The significance of this study is to strengthen the model through its application to 23 Things International – a real-life and appropriate context – and

thereby offer new material insights into factors influencing the research practices of doctoral students and their supervisors.

23 Things International

The 23 Things International programme is a 14-week, online, self-directed programme that is targeted to an audience made up of doctoral researchers or students, doctoral supervisors and early career researchers. The programme provides the basis for engagement with 23 tools or techniques – the "'Things" – which provide an opportunity for participants to build academic and research networks, increase familiarity with resources to underpin research and enhance their professional profiles.

The programme in its current form was first launched in 2020 as a collaboration among our institutions. It attracted 250 participants. In 2021, the collaboration attracted additional partners and the label "international' became more meaningful. That year, it attracted 400 participants. The following year, 2022, the number of collaborating institutions expanded to include the universities of Surrey, Cambridge, Swansea and Royal Holloway (United Kingdom), the University of Otago and Auckland University of Technology (New Zealand), Avondale University (Australia), University College Dublin (Ireland), the Africa Research Excellence Fund and the Techne Doctoral Training Partnership (United Kingdom).

The 23 topics across the 14 weeks of the programme (two Things per week, with 2 break weeks) are set by the organising group, basing such scheduling decisions on the group's experience and knowledge of the likely interests and needs of the participants. The content of each topic is determined by voluntary contributions from academic or professional experts drawn from across the participating institutions. Each topic or Thing takes the form of a blog post. The blogger-experts are invited to choose an aspect of their topic of expertise that they see as relevant to prospective participants, and we provide some general guidelines on structure. Typically, a blog will include a brief overview of the topic, an element of a voice of experience to establish the expertise and relevance of the author and a how-to element that encourages guided experimentation with the tool or technique. Examples of Things include building a personal website; crowdsourcing for research; podcasting; using Google Scholar and similar platforms; bibliometrics and altimetric; understanding open access and copyright; accessible design; conducting and participating in research meetings and supervision online; and career planning for researchers.

There is also an arrangement that groups participants with overlapping research interests into pods, the intention being to provide a chance for participants to build international networks, across institutions, and work together to get the most out of the programme. Some blog activities target pod activity specifically to prompt pod member interaction.

The 23 Things International website is the hub of blogger activity. It is where participants in the programme are invited to comment on the blog topics or engage in conversation with each other and with the blogger. It is also a place where comments or reports from meetings with pods can be shared, and can include anything of relevance, such as web links to further information that participants may have found in following up after reading a blog.

Finally, another feature of the 23 Things International programme is live events. These vary each year but include a launch event (in Gathertown; https://www.gather.town/), coffee mornings (Zoom) and a rolling 48-hour virtual writing retreat hosted jointly by the United Kingdom, Australia and New Zealand institutions. As well as creating chances for participants to connect, these are a further way to demonstrate useful online platforms.

Data sources and analysis

With each iteration of the programme (2020–2022), data were collected about a range of aspects related to the participants, website traffic and completion rates. These data were gathered through the following means:

(a) a registration form (e.g., stage of study (doctoral researchers only); full-time or part-time study status; disciplines; research fields; and reasons for enrolling in the programme)

(b) website use (e.g., subscriptions to the discussion forums; number of site sessions; website visitor locations; main access devices used by participants; patterns of website traffic; numbers of contributing authors to each forum discussion)

(c) completions (self-declaration, defined as reading the majority of the Things and undertaking at least half of the tasks)

(d) an anonymous end-of-programme evaluation form and volunteer focus groups (gathering feedback on the experience, value or worth of the programme; levels of engagement; positive and negatives; and suggestions for future enhancements).

Ethical approval was granted by the University of Otago Human Ethics Committee (ref: F23/003).

Within a broadly interpretive approach (Erickson, 2012), our investigation involved the refinement of our understanding of perceptions about 23 Things International held by the participants over the course of the programme. The process was iterative and inductive (Thomas, 2006). It involved thematic analysis (Silverman, 2001) and the capture of major and common ideas (Mayring, 2000). This refinement of researcher understandings about participant experiences of 23 Things International and links with the model occurred progressively, across encounters with participant interaction and activity. For the purposes of this paper, the end-of-programme evaluation and focus group discussions (data source (d)) provided the bulk of the data included, because they specifically capture participant views of their experiences. The registration form (data source (a)) and self-declarations (data source (c)), also generated a small number of comments (an average of 50 responses per year).

Only qualitative data was adopted. This reflects both the relatively small number of participants and the objectives of this study, this is, an open exploration of the worth of the theoretical model. More important than statistical confirmation is the evidencing through consistency over iterations that could be gained by looking at data gathered over 3 years – that is, three separate groups of participants. The study aimed to ascertain "the 'truth value' of a given inquiry, that is, the extent to which it established how things really are and really work" (Guba & Lincoln, 1989, p. 234). Working with 23 Things International data provided one well-tested pile in the foundations for the model.

The focus of analysis was on indications of factors that may influence or determine person-ICT-context connections and how participants adapt and enact their ICT selves within contexts. The internal and external factors laid out in the model then guided this broad sweep analysis but simultaneously also enabled us to critique the clarity and overall utility of the model. We were keen to ascertain whether the components within the model were drawing attention to elements that could provide increased awareness and understanding about the experiences of those involved in doctoral and early research. One long-term aim for the model is to enable better insights into how to create positive learning and supportive environments for researcher development.

Results and discussion

This section discusses the internal and external factor components within the model (Figure 1) through illustrations provided by the data collected about 23 Things International across 2020–2022 (three iterations). The data sources drawn upon to provide supporting evidence for the discussion come principally from the end-of-programme evaluation responses (quotations are labelled "Eval, 2020/2021/2022") and from the focus group discussion transcriptions (quotations labelled "FG, 2020/2021/2022").

Although there are many places of crossing in the responses gathered, we have divided out this discussion into external and internal factors, followed by the challenges posed when internal and external factors may stand in tension. External factors (beyond individual control) include things such ICT availability (Werang & Leba (2022), institutional culture and social dynamics. Internal factors (more closely

determined by the individual) can cover personal beliefs and motivations, the rationale for one's approach or research and individual awareness of ICT affordances and advances. By considering the different factors in this way, we are better able to show the diversity of relationships that may exist between researchers and ICTs and how several apparently distinct factors can become entangled.

External factors: Engagement with the content of 23 Things International

Commencing any evaluation of a programme of learning by asking participants about the content they encountered can be a pragmatic and concrete way to prompt thought about the worth and value they placed on the learning experience. We received many comments about the kinds of Things and learning processes that participants noted as being important to them. Some mentioned ICTs specifically:

> I hadn't looked too closely at how I might benefit from LinkedIn, Twitter, Instagram etc. I plan to make greater [use of them]. (Eval, 2021)

Others focused more upon the academic activities, such as publishing research, as in:

> My understanding of publishing articles is vastly improved. (Eval, 2022)

Still others highlighted the value of interaction with each other, helping them to learn more about ways of interacting and using ICTs within academia, as in:

> I am better at collaborating with others after discovering MS Teams. (Eval, 2020)

> We shared a lot of each other's experiences in using the proposed tools and work experience. (Eval, 2022)

and introducing new thoughts and possibilities, for example:

> Pushing me to do tasks I wouldn't do otherwise, especially creating the website. I also enjoyed the food for thought regarding things such as accessibility I potentially wouldn't have thought of but now I will keep in mind. (Eval, 2020)

> [A highlight was] opening my eyes and mind to the variety of Things out there. Pushing me out of my comfort zone, for example, creating a website. (Eval, 2021)

The model lays out components of both external (e.g., how publication happens; use of social media for academic purposes; and contexts other than mine) and internal factors (personal experiences; my understanding) that may be of relevance here. We were struck that many responses referenced the importance of external factors in motivating them to commit effort to their engagement with ICT – getting a push from the programme to undertake tasks, discussions with their peers in the programme or the programme content explaining aspects of the wider professional research landscape. Many were enthused to find out more about what is out there in terms of useful tools (ICT availability on our model).

The opportunity to share and hear about others' experiences seems to have been noteworthy for participants of 23 Things International. In some cases, we can determine this external factor to be a driver for changing internal factors, as being placed within the social dynamic of 23Things prompted them to reconsider (and act upon) their own personal construct development (internal factors).

Internal factors: Applying what has been learnt

Asking participants in a course to describe how they have applied their learning can be a good prompt for thoughts about the usefulness of the content. In addition, it can also signal that individuals may be going through processes of translating ideas into meaningful practice.

Participants talked about making use of the tools, technologies, processes and ideas presented in the blogs in their own work. Although in many cases their encounters thus far had only been introductory, many felt they now had the momentum to embed new approaches in their research; the programme offered effective thresholds for further exploration (Meyer & Land, 2003). For example:

> I learned about all these tools, like Tablo … I had no idea what it did. I usually make my own graphs and … you know, there was this whole suite of tools, multiple different companies and people offering these tools I just never even heard of. (FG, 2020)

> The blogs were really clear and discussed a load of things that we should learn in training but often don't, so a bit of a lifesaver. Really useful on stuff like networking and frameworks for measuring research. (Eval, 2022)

Some even went beyond the core content and blogs activities to create something new that they saw a need for or an opportunity to capitalise upon, for example:

> I went through and properly set up my professional Twitter profile … and as part of that I ended up linking in with an oncology consultant in India. We've written two papers so far together. And we've got another couple on the go. Just as an international cross collaboration. We've never met … I basically got a cold email through Twitter, but because I knew that he knew somebody else professionally, I actually jumped and actually did it and it ended up being a really good working relationship. Wow. (FG, 2020)

> [We] shared websites, commented on each other's work, had a separate ZOOM meeting to discuss our projects and the possibility of a joint publication. (Eval, 2021)

From hearing accounts of others' experiences and settings (external factors) and thus having encountered something that struck them as interesting or useful, the individual then works with those ideas to make them their own. The process of taking encounters that may be labelled as "external factors" within the model and translating them into an action or decision ("internal factors" at the centre of the model) includes conscious and unconscious processes of considering, for example:

- Is this right for me? (personal constructs)
- Will it work within my PhD setting and research area, and fit the demands and expectations surrounding my PhD study in my institution? (context)
- Do I know enough about it, and will its use fit with my way of doing research or study? (personal constructs, context)
- Do I know enough about the process or technology? (awareness)
- How shall I go about trying it out? (action, decisions)

Resultant actions may or may not occur immediately, or may not occur at all, but the opportunity presented through 23 Things International invite individuals to broaden their understanding beyond the immediacy of their own experiences. If a change or modification to current ways of thinking and acting is going to happen, then the individual needs to believe that the action is intelligible, plausible and fruitful (Posner et al., 1982); thus, space and time are usually needed for an individual to make something their own. As the examples quoted above show, these participants have gone through their own process of consideration – sometimes surprising themselves in the process ("I actually jumped and actually did it … Wow"). A feature that indicates this process in the responses is how often participant reflect from the content back on their own situation, such as their previous practice ("I usually make my own graphs") or other training they have attended.

As an additional indirect way of seeing this move from internal to external factors, a frequently observed scenario is that each year some participants have re-enrolled for the next edition. For 2022–2023, for example, there were 43 re-enrolments. This could be an indication that they are interested in continuing

their learning development and this programme is serving as an impetus for them to undertake that goal. This could indeed be read as a transition from internal to external factors, as the participants have been motivated to re-examine their personal perspectives and affordances, leading them to make use of the external prompts they know can be found through the programme.

External and internal factors: Tension between structure and open-endedness

One commonality in the transitions between external and internal factors touched on above is the issue of structure (Zhu, 2022). To put it very simply, a very pronounced and set structure can be a more effective external factor but can also a demotivator for people to connect it to their internal factors – there is no impetus to make it theirs. On the other hand, a lack of structure can be a much weaker influence for change; participants may feel a greater sense of ownership and comfort but are not pressed into situations of change (Doo et al., 2020; Sharma & Hannafin, 2007). This tension between prioritising internal and external drivers and barrier is shown in the progressively developed approaches taken by the 23 Things International programme over the period covered in this study.

Its design is such that it provides opportunity for learning without the shackles of formal assessment and other kinds of monitoring. By respecting the diversity and multiplicity of participants resources, motivations and other responsibilities, we aimed to lean into the internal factors of individual, allowing them to make the programme theirs to a greater degree than a more prescriptive mode; in fact, diversity matters in both participants and approaches, enriching the possibilities of engagement (Sim et al., 2020). We were keen to think about that (possible) impact and if or how our understanding about what could be occurring for participants might be informed by the model.

Enrolment numbers, attrition rates and completions are the most usual criteria used in claims about success or failure of courses. Mechanisms are incorporated into courses to boost scaffolding, offer guidance and keep motivation and interest high, and assessment tasks are carefully crafted to capture evidence of learning, matched to programme goals. In 23 Things International, however, criteria for success are different. The principles underpinning the structure and process of the programme are such that the course is voluntary, and there is no assessment. We are thrilled that our registrations are growing, and the completion rates, which are based on self-declaration, should deem the programme a success when compared with other online massive online open course-type programmes. Those rates can vary can vary between 0.7% and 52.1%, with a median value of 12.6% (Jordan, 2015). Completion rates of 23 Things International were 15%–20% for 2020–2022.

Understanding the audience is an important consideration in the design of any course. Doctoral researchers have research and study obligations to fulfil, and the institutions they are connected to have their own processes and criteria surrounding study regulations, structure and amount of time an individual can spend on other activities such as paid employment. However, reality is such that many aspects of importance to the academic and researcher world are not formally incorporated within doctoral research candidature or, even if they are, they are given varying degrees of emphasis and importance. For most doctoral research settings, outcomes of the research project and the creation of accompanying dissemination documents (i.e., the thesis and/or peer-reviewed papers or performances) and presentations are the artefacts that are judged. Understandably therefore, most doctoral researchers are very focused on those end points.

Knowledge of the (predominantly) university-based researcher context was of primary importance to the design and development of 23 Things International: it could not transgress formal doctoral candidature obligations of the variety of institutions the participants were from and had to recognise the focus of doctoral researcher effort. The course needed to be open, open-ended and voluntary but also relevant and promoting development appropriate to participants' career stages. Finally, the international mixed and varied career stages of participants had to be taken into account for the tone and level of detail in the blogs and the availability of the resources mentioned.

Many comments we have gathered about 23 Things International over the past few years do recognise that this overall goal and approach are positive, enabling participants to take what they need from the experience and follow up on ideas that made sense to them and were of relevance to their research world, for example:

> This is an excellent opportunity to have, with no cost at our setup. The contents are very informative and important. The delivery method (platform) is also good enough. The pod meeting lets us know each other for future networking possibilities. (Eval 2022)

> When I guess a lot of the Things led me to other things like, … it's not in the 23 Things course, per se, but, when we did accessibility [Thing] … that led me to learn about the kind of code [in] web content access guidelines which is put together by some consortium….So I've got my own website " I made the drag and drop. … And so that accessibility Thing led me to read a lot further than was maybe in the scope of the Thing. That's going to be really helpful going forward. (FG, 2020)

However, participant reaction has varied. Despite the intended open-endedness of the programme – emphasised to participants before and throughout – we have repeatedly received comments about wanting firmer structures and limits, for example:

> Voluntary participation encourages laziness and lack of required communication. (Eval, 2021)

> Depression and lack of energy to engage with other people; this never stopped me from completing the online 'Things', but made interpersonal tasks harder. (Eval, 2021)

Some have suggested including an element of assessment of knowledge development, for example:

> Add maybe practical stuff. So it is not so theoretical (Eval, 2020)

> Better if some objective assessment may be added to the content (Eval, 2022)

Or the introduction of completion tracking, as in:

> It's well organized. But, it didn't give a chance to discuss with Pod members as everyone tries tasks in different days/weeks. Better have more group tasks and a window to try (Eval, 2020)

> A better system for monitoring pod attendance and participation in group activities. (Eval, 2022)

Although not always about assessment as such, other comments have suggested stronger scaffolding structures to enable participants to maintain their engagement with the programme. These comments summarise those sentiments:

> I was happy getting on with things on my own but it would have been nicer to connect with other students. (Eval, 2020)

> I prefer a formal structure and common purposes to engage people and some tutoring sessions for web or blog building and panel discussion or presentation about publication and communication. (Eval, 2022)

The opportunity to network internationally is repeatedly viewed by participants as a key attractor of enrolments in the programme, with the incorporation and chance to be part of the pod structure receiving strong positive support:

> I thought it was a great way to connect academics across the world. (Eval, 2020)

> This course has really given me a push to network more. (Eval, 2021)

However, of all the components within 23 Things International, the implementation and experience of the pod structure has received most criticism and critique, and its inability to provide the envisaged opportunities for networking has been a source of disappointment both for participants and organisers. Helpful suggestions have been gathered from participants, though, such as:

> Having more structured pods, maybe with a moderator to encourage discussion would be really valuable. (Eval, 2020)

> Have a [pod] coordinator who actually does have a role in initiating things. (Eval, 2021)

Even when members of pods did actively interact, not everyone in the more successful pods was completely happy with those interactions, for example:

> That's the thing I encountered during the programme because people oftentimes didn't read the you know the post didn't read it, and they don't want to talk about that, they just want to talk about their own studies (FG, 2022)

> The lack of engagement of the pod made the programme a little less rewarding. I wish we had been able to collaborate more but it seems everybody was super busy (and probably understandably so). (Eval, 2021)

In contrast, however, and putting the specifics about the pod structure aside, there were comments made by some participants about the freedom that the structure of 23 Things International fostered. For example, one participant talked about how the programme facilitated deeper understanding about being a researcher and learner more broadly, pointing out that more formally structured courses often inhibited positive development:

> That was actually it for me, is not to be judged. It didn't really matter what I was doing, because I just thought, well, this is a space where I don't have to study or I don't have to do this. I don't have to do these things. … If I didn't understand it, it didn't matter. You know, because I can go back to it if I need to go back to that and see and understand a different time. (FG, 2020)

Expanding on those thoughts, the same participant provided a more detailed example of the impact that the freedom of boundaries around 23 Things International provided:

> I'm not very good at writing, or I don't think of myself as very good at writing, and I really surprised myself by, so I blogged about every single thing and I really surprised myself having this space to write without judgement or like having to check every sentence … Really, really nice like, as a great way to learn, you know. To practice. Writing is not going to get better by not writing and so that was a huge thing for me. … It was a really nice space to just write and think about things and write, and have no one be like, that's a "C". (FG, 2020)

Looking at the model, tensions between the tight and loose structures, the overall open-ended and voluntary nature of 23 Things International and participants' expressed experiences and views have

prompted us to consider why the range of participant reaction occurred. Personal constructs about what constitutes a programme of learning could be a reason why some participants express a mismatch between their expectations and ours.

These personal constructs might be about a range of elements, including:
- past experiences and beliefs about the 'normal' practices one might expect of a programme
- range, balance and depth of exposure to different kinds of learning programmes
- personal views and preferences about learning developed across formal and informal study and life events
- broader knowledge and views of the world, beliefs and values about learning, interacting and communicating.

In addition, external factors might also play a part, for example:
- current and past experiences of institutional, discipline and departmental cultures
- common practices and thinking, norms and expectations
- views, beliefs and habits observed, experienced and read about and encountered as part of the wider environment or situation the person exists in.

Thus, we have found the model to be of use in prompting us to think about the situation more deeply and question the building blocks of the 23 Things International programme.

That process of reflection has solidified our conviction about the principles underpinning 23 Things International, maintaining an adaptable and personalisable experience that offers opportunity without onerous strictures or requirements. Simultaneously, our developing insight has enabled us to think in practical terms about how to manage the disparity between the expectations of the programme and those of some participants in future iterations of the programme. For example, for the 2022 and 2023 iterations we created an engagement mentor role, whose function was to provide light-touch encouragement to each pod, facilitating initial meetings and being a visible point of contact, without insisting on a one-size-fits-all approach.

Limitations

Although the qualitative data collected for this study is extremely informative and illustrates how the model consistently captures shifts between identifiable internal and external factors, we acknowledge a number of limitations. Firstly, the data is not complete but represents a subset of programme participants who voluntarily provided feedback; it should be assumed that particularly for the focus group volunteers, this group was self-selecting from among those who found the programme valuable. Nonetheless, since the evaluation forms and focus group questions were designed to elicit answers about the 23 Things International programme and not directly about the theoretical model, we find that the responses show participants answering and talking in an unforced and wide-ranging way; this helps to eliminate concerns about leading questions of biases. Finally, the fact that we collected and compared data over 3 years gives a solidity to the analysis. One factor that may be both a limitation and a strength is that both the course content and the make-up of participants changed each year, since blogs were updated and new partner institutions were added. (In particular, with the Africa Research Excellence Fund joining, we had many participants from different African countries and at more diverse career stages but also a greater concentration of researchers in the field of health science.) Although these changes mean that not exactly the same things are being measured that participants respond to, on the other hand, this variety helps to prove the wider applicability of the model, since we still found the same patterns of discovery and push (external factors), applications and confidence (internal) and tensions between structure and personalised engagement. Future work to further disentangle differences between participants – their career stage, location and other demographic factors – may be valuable in future, but so far this data has either not been collected or analysed, largely for practical reasons of running an international course.

In summary

Through feedback gathered from participants of 23 Things International during 2020, 2021 and 2022, we have been provided the opportunity to consider the worth of the model (Figure 1) to help us refine practical aspects of the programme in the future. We feel better able to articulate why we are doing what we are doing, and why the programme is structured the way it is. We are also now better placed to take informed steps to build and modify the programme in the future to counter mismatched expectations before they even germinate. These moves will also be reflected in our ongoing monitoring and evaluation processes.

Comments such as the following give us encouragement and motivation for pursuing these kinds of refinements in every iteration of the programme:

> Reflecting on the 23 Things and how I participated in it, I feel like I've sort of developed as a more round well-rounded sort of professional because there were all these bits and pieces of which I was sort of taking from each of the Things, and I can see myself applying them for what I'm going to do after study and how I could apply these things with future projects and activities. (FG, 2020)

The model is helping us to clarify our convictions about how this programme can be the catalyst for participants to make the ideas they encountered within the programme their own.

Conclusion and future work

This paper has reported a first-phase exploration of the utility of the theoretical model presented in Figure 1 for identifying relationships between ICT and the person that impact on how doctoral researchers respond to researching and studying in a digital environment. Using 23 Things International as the context, the study made use of comments gathered from participants in the programme about their experiences of learning and developing their understandings about ICT-person-contexts within a doctoral research context.

As a different kind of programme from typical learning and development courses, that is, being self-directed, flexible and completion being self-declared, 23 Things International cannot be monitored for success against criteria used to evaluate most organised courses of learning. Although the data showed us how well the programme was perceived by participants, at the same time it allowed us to look for possible indications of how the course was highlighting, facilitating or simply reflecting the many components that the model incorporated. The exploration has focused our attention on several actions that will be incorporated into the next phases of testing the model and refining 23 Things International.

We have found the model to be useful for drawing our attention to aspects of importance where external and internal factors related to the context-person-ICT relationships of the participants within the course are concerned. It has become clear, however, that there is a need to clarify the meanings of the labels given to the components that are currently in the model. Although clarity is needed, too much specificity may also result in narrow applicability for the variety of learning and teaching contexts in which this model may be of use (e.g., personal constructs stay within the three listed aspects instead of the factors that affect those aspects).

We now also see the need to make better use of work such as that by Garrison et al. (1999) to guide and inform the course design. Using the frameworks from their work to facilitate an analysis of how the structures built into the 23 Things International programme facilitate participants' sense of cognitive, social and teaching presence (and thereby how the programme nurtures a community of inquiry) may be a useful way to gain deeper insights into how participant responses to the programme structures are able to be understood in terms of the components within the model.

Finally, the ongoing design of our 23 Things International programme monitoring and feedback-gathering strategies will be informed by the current exploration. For example, it has become clear that there is a need to boost our and the participants' attention to person-ICT-context relationships and plan ways to better understand the variety of participant learning, study and research practices in their individual settings. Modifying the questions posed within the focus group discussions, including prompts within the registration form and the development of individual case studies, may be methods that will enable us to delve a little deeper into the internal and external factors that are influencing and determining participant understanding and engagement with 23 Things International. At the same time, the aim to clarify the nature of the elements within the model would inform and shape how those methods are designed, developed and implemented.

Author contributions

Sarah Stein: Conceptualisation, Investigation, Writing – original draft, Writing – review and editing; **Kwong Nui Sim**: Data curation, Investigation, Formal analysis, Writing – review and editing; **Mike Rose**: Investigation, Writing – review and editing.

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