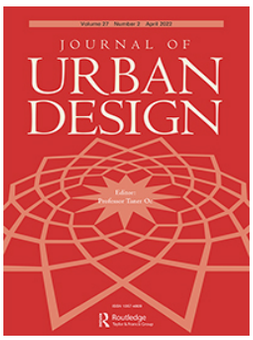

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Research through design in urban and landscape design practice

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ABSTRACT

This study takes stock on how research through design (RTD) is interpreted in urban and landscape design practice in relation to the scholarly meaning of RTD. The results indicate that the term 'RTD' in Dutch practice largely refers to the typical procedures and resources of a practical design process. This interpretation differs from definitions of scholarly RTD which have more focus on the rigid testing of design alternatives. Such a scholarly RTD approach is advisable to ensure the validity and robustness of design products. This study recommends that this approach to RTD is adopted in urban and landscape design practice.

KEYWORDS

research through design; inquiry by design; design research; design methodology; design practice

Introduction

The backdrop of this study on research through design (RTD) in urban and landscape design practice is shaped by the discourse about the relationship between research and design. To sketch this backdrop, a short overview of the ideas that have contributed to this discourse relevant to urban and landscape design is first provided.

The relationship of art and science, and related methods of creativity and research, have been the subject of academic discourse for more than a century in the design disciplines and been proliferated by modernist movements (Cross 2007). Fuelled by scientific and technological progress that supported design process and outcomes, the discourse developed further and, in the late 1960s and early 1970s, the seminal works by Simon and Hubka and Eder proclaimed close relationships between design and science (Hubka and Eder 1987; Simon 1996). In architecture and urban design, Hillier, Musgrove and O'Sullivan (1972) built further on this train of thought and started to develop computer tools to predict the outcomes of design options, such as Space Syntax. In the early 1980s, this close relationship between research and design was cast into a terminology that suggested a synthesis of research and design: 'inquiry by design' (Zeisel 2006). The 1980s brought rather important insights into design research that led to an understanding that the nature of design has its own 'designerly way of knowing' (Cross 1982), a way that is different from the construction of knowledge in the positivistic Cartesian sciences and from the humanities, too (Luck 2019, 154). In the early 1990s, the discourse on the marriage of the terms 'research' and 'design' became lively in various design disciplines (Carroll 1997; Frayling 1993; Gero 1990).

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In the Netherlands, the association between design and science was adopted early in the fields of architecture, urban design (Jong 1992) and landscape architecture (Dorst 1997; Harms, Knaapen and Lankhorst 1991), where the term '*ontwerpend onderzoek*' (literally, 'designing research'; colloquially, 'research by design') occurred. Much academic work followed suit internationally by, for example, Findeli (2001) and Dilnot (1998). The Dutch discourse on the topic in various spatial design disciplines has been established early, cumulating in a conference on 'Research by Design' (International Conference Faculty of Architecture Delft University of Technology in cooperation with the EAAE/AEEA, 1–3 November2000). This discourse has been covering both the professional (Boekhorst 2006; Harms, Knaapen and Lankhorst 1991) and the academic spheres (for a review, see Duchhart 2011).

The past two decades brought a proliferating academic debate about the methods on the interface of design and research in urban and landscape design. In the early 2000s most voices were rather sceptical about the idea of design being (a part of) research (Deming and Swaffield 2011; Milburn and Brown 2003; Milburn, Brown and Paine 2001). Yet, simultaneously, the proliferation of computer-based simulation tools that can predict design outcomes paved the road to a closer relationship between research and design. The opinions started to change about 10 years ago, when the discourse began to broadly embrace the synonym notions of 'research by design' or 'research through design(ing)' (Lenzholzer 2012; Nijhuis and Bobbink 2012; Lenzholzer, Duchhart and Koh 2013; Brink et al. 2017; Nijhuis and de Vries 2019). For simplicity, this article adheres to the term 'research through design' (RTD).

Despite the evolution of RTD studies, a recent literature review of the academic literature arguably employing RTD by Lenzholzer, Nijhuis and Cortesão (2018) indicates that in academia a wide range of interpretations about the meaning of RTD occurred. The results of that study showed that only a small number of academic publications dealt with RTD in a scholarly sense, that is, meeting the requirements of academic research such as originality, validity (internal and external), transparency and reliability (e.g., Cook and Campbell 1979; Jong and van der Voordt 2002; Creswell 2011; Lenzholzer, Duchhart and Koh 2013; Prochner and Godin 2022). Furthermore, the study revealed a general misappropriation of the terms 'research' and 'research by/through design', which seem to be used simply to describe a design process instead of a structured and in-depth reflection on the design products created. Many publications were found that did not make explicit what the research questions were, which design options were chosen and why, and did not originate new insights going beyond site-related learnings. This lack of rigour in the so-called 'research' methods within RTD may lead to ill-argued constructs which might compromise the integrity of knowledge and, thus, the validity of future research in urban and landscape design. The loose understanding of RTD in practice might jeopardize the validity, transparent decision procedure and robustness of design artefacts, as well as potentially lead to problems such as construction failures, or additional cost or non-acceptance by stakeholders.

To develop evidence-based design solutions, a scholarly conception of RTD that involves 'research' in the academic sense, as framed by Glanville (2015), has been suggested by several studies (Cortesão and Lenzholzer 2020; Cortesão et al. 2019;

Jonas 2007; Lenzholzer, Duchhart and Koh 2013) on urban and landscape design. Within this conception, RTD follows clear research questions and its design process involves various iterations to develop design solutions which are tested with scientific research methods. Eventually, the best performing design proposition(s) can be identified. Research knowledge is embodied in the final design/artefact and refers to either replicable design knowledge, that is, design knowledge that is not site specific (e.g., virtual design prototypes or design principles applicable to multiple similar contexts) and has both internal and external validity; or research knowledge embodied in site-specific designs, that is, designs developed with an in-depth understanding of their effects on the relevant performance criteria for one specific site which, however, lead to a lower degree of external validity. Figure 1 summarizes this conception in an indicative and simplified representation of a scholarly RTD set-up.

Apart from a widening discourse in academia, one can also discern an equally widening discourse in urban and landscape design practice, within social media and in professional magazines. The multiplicity of interpretations of 'RTD' across the academic discourse calls for enquiring and understanding the meaning of 'RTD' in urban and landscape design practice. This paper addresses this need by presenting new insights into the topic, based on the outcomes of a survey across multiple Dutch urban design and landscape architecture practices. The following main research question was formulated:

- What is the meaning of RTD in Dutch urban and landscape design practice?

To answer this overarching research question, four sub-research questions were defined:

- What are the sources of knowledge informing designs in practice?
- What does 'research' mean for practitioners?
- What does 'RTD' mean for practitioners?
- Do practitioners conduct RTD and if so, how?

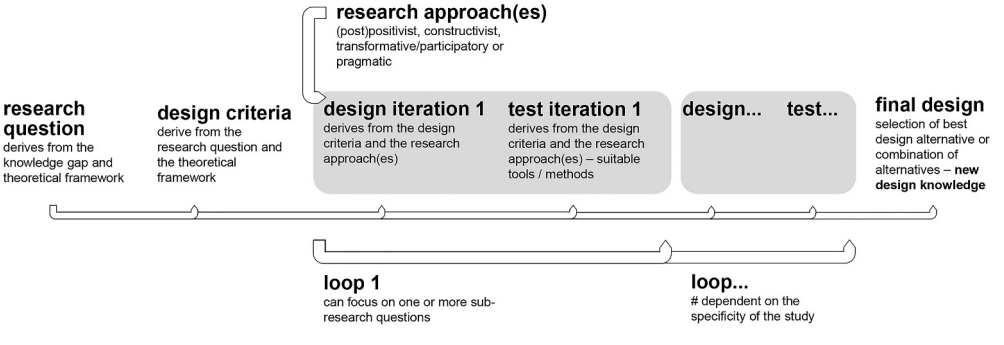

Figure 1. Indicative and simplified representation of a scholarly research through design (RTD) set-up.

Materials and methods

Collecting the information

To answer the research questions presented above, this study comprised a survey conducted across Dutch urban and landscape design offices. The Netherlands was chosen as the case because the discourse on RTD has evolved quite prominently not only in Dutch academia but also in practice, with many design offices reporting about their RTD (in Dutch, '*ontwerpend onderzoek*') projects. This discourse on RTD is less prominent in other countries, particularly when it comes to design practice using RTD. The richness of data obtainable from the Dutch urban and landscape design practice made the Netherlands a suitable case for this study.

The survey was conducted across nine well-established design offices in the Netherlands: BoschSlabbers Landschapsarchitecten, Bureau B+B Stedebouw en Landschapsarchitectuur, Defacto Architecture & Urbanism, Feddes/Olthof Landschapsarchitecten, FLUX Landscape Architecture, H+N+S Landscape architects, MRVDV architects, Niek Roozen Landscape, and West 8 Landscape architecture–urban design–infrastructure. The survey was held face to face with senior and junior practitioners at each office. The survey was conducted between April 2019 and May 2020 by landscape architecture students from Wageningen University and consisted of semi-structured interviews covering the following questions (with reference to the sub-research questions in parentheses):

(1) What are the sources of knowledge informing designs in your practice? (sub-research question 1)
(2) What does 'research' mean to you? (sub-research question 2)
(3) What does 'research through design' (RTD) mean to you? (sub-research question 3)
(4) Do you conduct RTD in your practice? (sub-research question 4)
(5) If you conduct RTD, can you give an example of how you did this in one of your projects? (sub-research question 4)

Questions 1–3 deal with the meaning of RTD in practice, while questions 4 and 5 relate to the application of RTD in practice. All questions were open ended, except for question 4, to which 'yes' and 'no' were provided as closed-ended options. Across the nine offices, 47 interviews were completed.

Processing the information

The data obtained with the interviews underwent a content analysis. The first step entailed a conceptual content analysis. A coding scheme was created to this end by plotting and processing the data obtained with the interviews in Excel spreadsheets. Subsequently, the frequency of codes was depicted with basic descriptive statistics. Finally, the codes created underwent a relational content analysis (co-occurrences) performed with ATLAS.ti.

Regarding the first step, the codes were created by identifying keywords across the Excel spreadsheets that directly or indirectly linked to the following overarching parameters:

- Question 1: sources of knowledge mentioned.
- Question 2: terms that describe the meaning of 'research'.
- Question 3: terms that describe the meaning of 'RTD'.
- Question 4: claims regarding the application of RTD.
- Question 5: mentioning of components of a scholarly RTD set-up (direct or indirect, full or partial mention to the components of the scholarly RTD set-up as in Figure 1).

The creation of codes and the number of entries for each code was made simultaneously as the reading of the answers progressed. The number of codes was expanded progressively until no new code generation was deemed necessary. The naming of codes followed the terms indicated by the interviewees. The codes were revised every time a more accurate word occurred, that is, a word better describing a code identified previously. Each code was highlighted in the Excel spreadsheet with a different colour to facilitate its identification throughout the multiple answers obtained. The number of entries for each code was made for one occurrence per answer only, that is, it excluded repetitions of a code in the same answer. The mentioning of different codes by the same interviewee was, however, taken into account. The codes were made mutually exclusive by merging similar codes into one overarching code named with the clearest term employed by the interviewees. For instance, terms such as 'knowledge from experience' or 'intuition' were merged into the code 'personal experience'. The final codes are presented in the figures in the results and discussion section.

Inconclusive answers (i.e., not-to-the point or unclear answers, answers not clearly relating to any code or out of the scope of the question, or in case no answer was provided) were registered as potentially relevant observations (i.e., aspects that could help interpreting answers) but were not part of the main data analyses.

The frequency of codes was depicted with basic descriptive statistics expressed as percentage distributions. While answers occurring only once were excluded, in order to prevent considering individual answers, codes occurring at least twice were included, to ensure a proper spectrum of possible answers to the research question.

The analysis of co-occurrences with ATLAS.ti was to further analyse the meaning of RTD in practice. Inconclusive answers and answers indicating unfamiliarity with the topic addressed in the question were excluded. In order to steer the content analysis towards the core aim of this study (identifying the meaning of RTD in practice) and help structuring the interpretation of data, the codes were linked to three meta-level codes entailing three groups of factors to which the codes referred:

- Person-related: comprises personal experiences and goals, and characteristics/aptitudes such as creativity or intuition.
- Practice-related: comprises objectives, resources and activities commonly employed in design practice (e.g., complying with a design assignment, sketching, or involving technical experts), as well as the design culture (i.e., creative identity and specific design procedures) of the office.
- Academia-related: comprises objectives, resources and procedures commonly employed in academia (e.g., generating new knowledge, articles, or methodological frameworks), as well as the involvement of academic experts.

These meta-level codes were identified simultaneously to building the coding scheme. When the answers comprised in a code were not clearly pointing out to one of these meta-level codes, the linkages were made with the most suitable ones. For example, the answers comprised in code 'talking to stakeholders and experts' (question 1) did not distinguish between technical and academic experts, hence this code was linked to both the practice- and the academia-related meta-level codes. Another example is code 'getting more insight on a topic' (question 3) that could relate to fulfilling individual knowledge quests, to learn about a subject required to conduct a design assignment, or to obtain new academic insights. This code was, therefore, linked to all meta-level codes.

Results and discussion

Question 1: What are the sources of knowledge informing designs in your practice?
The results obtained with the interviews show that the most common source of knowledge informing designs are 'precedents', that is, analysing and/or getting inspired by previous projects that addressed a similar design assignment or that dealt with similar or the same issues as the assignment in hand or, as mentioned by an interviewee, when 'you use a project and research how that project went and try to learn from that' (see Figure 2, which also illustrates other outcomes for question 1). The second most common source of knowledge is 'personal experience', which comprises aspects such as years of 'experience in practice', 'vision' on a particular matter, or 'intelligence'.

'Talking to stakeholders and experts' was the next most frequent code, followed by 'visual material' (i.e., inspirational materials such as pictures, photos or drawings produced by other designers) and 'spatial and context analysis' (i.e., field trips to the site and desk

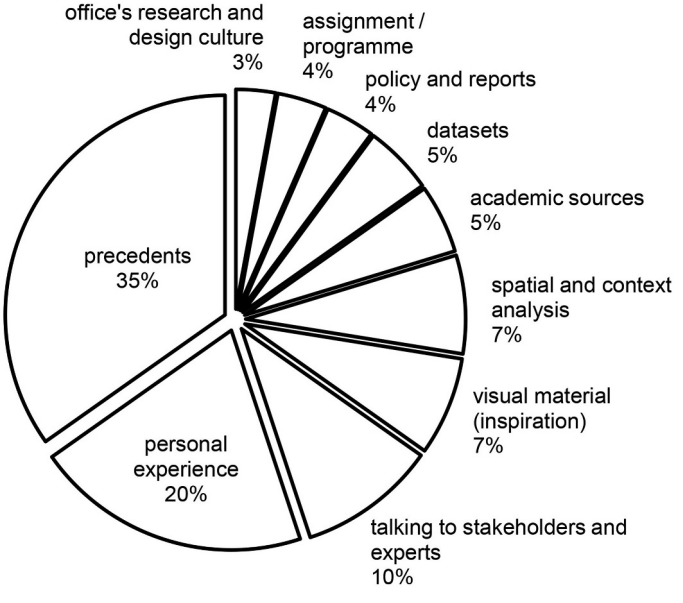

Figure 2. Results obtained with the basic descriptive statistics for question 1.

work on topics such as history, heritage or geomorphology). 'Academic sources', 'datasets', 'policy and reports', 'assignment/programme' and the 'office's research and design culture' present a similar (low) frequency. Five answers were inconclusive.

The answers to question 1 point out the multiple sources of knowledge informing designs in the practices contacted. Most of these sources relate to common activities needed to start and conduct a design assignment. Only seven answers relate to academic resources, which were mostly referred to be scientific articles. No mention to other resources, such as theses or seminars, was observed. These results suggest that knowledge produced at the academia has little presence in practice.

A possible reason to explain these results relates to an observation by Milburn and Brown (2016, 76): despite the growing number of research production in landscape architecture, practitioners were not using the knowledge created 'because it is on topics they do not think are important and being published in venues that they do not access'. Another reason could be the excessive use of jargon in scientific communication that may exclude lay readers.

As the reason for not embarking on wider incursions into academic sources, even when they wish so, time constraints were mentioned by a few interviewees. An interviewee mentioned at this respect that 'acquiring knowledge to initiate a project is very important but, regardless the attempts to do so, we do not have years to research on it'. This is an issue also identified in previous studies (Cortesão et al. 2020; Lenzholzer, Nijhuis and Cortesão 2018).

Despite the focus of question 1 on academic sources of information, it is important to highlight that RTD does not exclude non-academic sources mentioned by interviewees such as 'art' (within 'visual material') or 'intuition'. These types of sources are as relevant as academic sources as, for example, 'neglecting the art of urban design is liable to diminish the potential for urban design to be all it can be' (Marshall 2016, 399), which comprehends both measurable (e.g., square metres of green space) and immeasurable aspects (e.g., *genius loci*).

Question 2: What does 'research' mean to you?

The results obtained show that 'research' mostly means the 'gathering information about a topic' (see Figure 3, which also illustrates other outcomes for question 2). This is about searching for the background information necessary before starting to design (e.g., documentation about the site or policy that might affect the project) and/or carefully analysing the subject/issue that the design assignment addresses (e.g., climate adaptation or accessibility). This can be illustrated with answers such as '[research is] to carefully analyse the topic from a bigger to a smaller perspective' or to 'investigate causes, symptoms and impacts of a certain theme or aspect related to a project, always with relation to the context'.

The second most frequent meaning of 'research' observed is 'conducting spatial and context analyses' and 'raising and answering a question no one answered before'. The former relates to gathering site-specific information necessary to start designing and involves practices such as 'field work', 'map studies' or 'interviews' with stakeholders. As mentioned by some interviewees, the latter deals with aspects such as to 'challenge yourself in a field that is a bit uncomfortable to you' or 'to find out what you do not

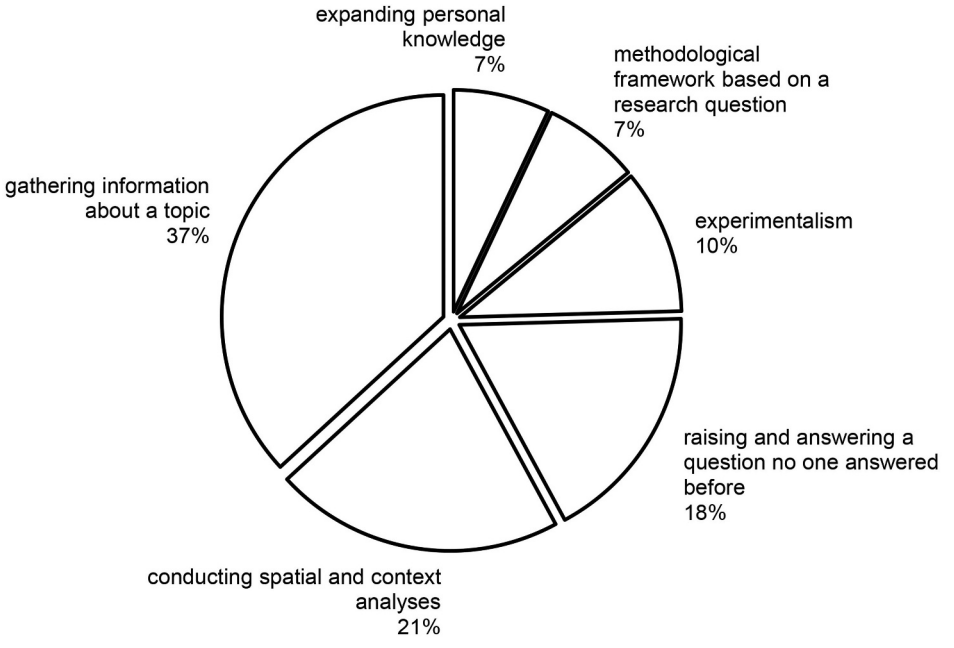

Figure 3. Results obtained with the basic descriptive statistics for question 2.

understand'. 'Experimentalism' is the next most frequent code, evenly followed by a 'methodological framework based on a research question' and 'expanding personal knowledge'. One answer was inconclusive.

Most answers to this question indicate that, overall, for practitioners, 'research' means common activities needed to start and conduct a practical design assignment. The results obtained also seem to reflect tensions existing between academic and practice-based interpretations of RTD. For instance, an interviewee mentioned that 'we do not bring a project to a higher academic level because it is a lot of work and not that fun' and another referred to research as 'a bit of an itch word'. However, the frequency of 'methodological framework based on a research question' and statements such as 'without scientific input our designs would keep lingering around speculations' suggest that some practitioners looked at scientific knowledge and procedures as relevant aspects to consider in practice. It can, thus, be argued that although there may be tensions between academia and practice, there is also openness amongst practitioners to the importance of academic knowledge.

Question 3: What does 'research through design' (RTD) mean to you?

The meaning interviewees give to RTD is mostly 'experimentalism' (see Figure 4, which also illustrates other outcomes for question 3), that is, the exploration of different design alternatives by experimenting with different mediums such as sketching or physical scale models. This can be illustrated by statements such as 'RTD is developing multiple scenarios and look for a complete bandwidth of possibilities leading to insights or problems'. The next most frequent code is 'getting more insight on a topic', followed by 'testing and adjusting options in a systematic/iterative manner'. 'Designing and

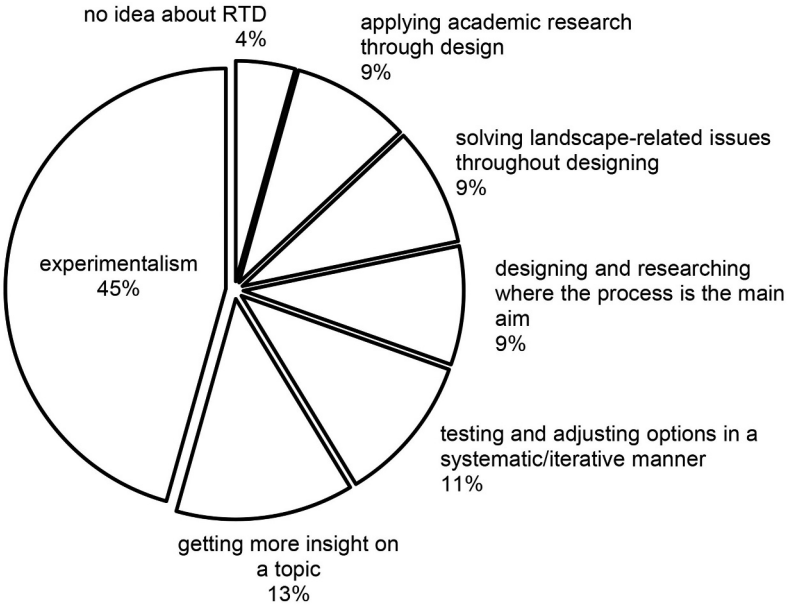

Figure 4. Results obtained with the basic descriptive statistics for question 3.

researching where the process is the main aim', 'solving landscape-related issues throughout designing' and 'applying academic research through design' share the same frequency. Two interviewees indicated to have 'no idea about RTD' and one answer was inconclusive.

In line with the answers given to the previous question, the answers to question 3 indicate that RTD in practice is mostly regarded as the common activities to start and conduct a practical design assignment. Although 'experimenting' came close, answers using this term did not comprise any mention to accurate testing leading to evidence, and placed an emphasis on intuition/instinct. For example, RTD was referred to as 'designing and sketching to get to know the assignment better and analyse in an instinctive way', as 'making options, test them in sketch, in 3D, in sections, in plan, in maquette; back and forth modelling, 3D printing', or as 'the interaction between the head and the hand'. One interviewee referred that 'we could probably be doing RTD in the office, but we are not officially capturing it, it is more based on intuition'. None of the answers made explicit how fundamental criteria in research, such as validity (internal and external) or transparency, were embraced in the RTD process described.

Notwithstanding, some practitioners did mention RTD conceptions such as 'testing and adjusting options in a systematic/iterative manner' or 'designing and researching where the process is the main aim'. Four interviewees acknowledged the importance of RTD in an academic sense and one of them mentioned that 'unfortunately' RTD tends to be forgotten or set aside in practice. This echoes the observation made for question 1 on how the nature of urban and landscape design assignments may limit the capacity of practitioners to undertake scholarly RTD. Regardless, practitioners do seem to understand RTD more as the creative process intrinsic to designing, and less as a scholarly RTD set-up, mostly due to the absence of any mention to the accurate testing of design alternatives.

The border between the meaning of RTD in practice and in academia is partly hard to set as, in many terms, typical design activities and RTD activities overlap. This is an issue that occurred in the early Dutch discourse on 'research by design', 'research through design' and 'study by design', where these terms were used interchangeably both for practical projects and academic projects that combined design with acquiring new knowledge (Jong and van der Voordt 2002). RTD is a process somewhat intrinsic to design activities (Carruth 2015) because designs get tested in practice – but usually not with academically sound research methods – and the practice of design/designing forms the backbone of RTD. It is, thus, understandable that there may exist some confusion about RTD terminology. Still, the results of the interviews show that the potentials of scholarly RTD are seldom acknowledged in practice.

Question 4: Do you conduct RTD in your practice?

Most answers to this question were 'yes', and 'no' was substantially less frequent (Figure 5). Two answers were inconclusive and, thus, herewith not included. These results indicate that a majority claimed to conduct RTD in their practices. The answers to question 5, however, suggest that these claims do not correspond to the application of a scholarly RTD set-up, as it will be discussed in more depth in the next sub-section.

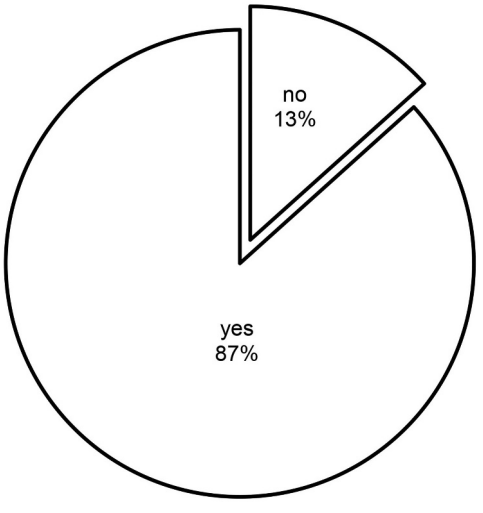

Figure 5. Results obtained with the basic descriptive statistics for question 4.

Question 5: If you conduct RTD, can you give an example of how you did this in one of your projects?

Given the array of answers obtained for question 5, and to facilitate their analysis, the codes were defined at a more overarching level, namely according to the relationship between the answers and the scholarly RTD set-up presented in Figure 1. These codes

were: 'full mention to the scholarly RTD set-up', 'partial mention to the scholarly RTD set-up', 'indirect mention to components of the scholarly RTD set-up' and 'no mention to any component of the scholarly RTD set-up'.

The results indicate the predominance of 'no mention to any component of the scholarly RTD set-up' (see Figure 6, which also illustrates other outcomes for question 5). The 'indirect mention to components of scholarly RTD', which included the test of several design options using 'computational methods' and 'performance-scoring', occurred once. No answer partially nor fully included the scholarly RTD set-up. Ten answers were inconclusive.

The most striking observation here is that while most interviewees claimed to conduct RTD (question 4), no description of the project(s) indicated in question 5 comprised any direct or indirect, full or partial mention to the components of the scholarly RTD set-up presented in Figure 1. The descriptions also did not comprise any other structured processes led by the results of accurate testing of designs. While a 'research question' was frequently mentioned, this question was never presented nor was any explanation or hint provided on how answering that question employed any form of scholarly RTD set-up.

No consideration could be found about the internal and/or external validity of the projects presented. None of the answers explained how the project held a causal relationship between two variables (e.g., a solution to address a given issue and the effects delivered), or how this relationship could be generalized. The interviewees also did not expand on the creation of a transparent and, thus, traceable design decision-taking process. The descriptions mostly encompassed how the assignment/programme received from the client was fulfilled. An example of this is the answer 'I had to design a park with different points for panoramic views; I tried different solutions, solving heights and best

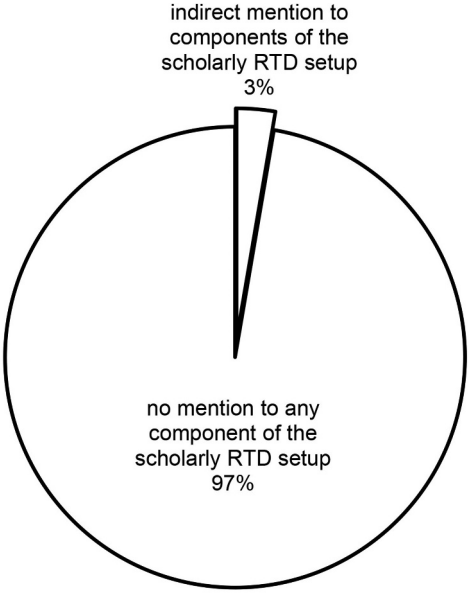

Figure 6. Results obtained with the basic descriptive statistics for question 5.

position to reach good qualities'. Other answers covered more overarching considerations about spatial design, such as 'every product is RTD, every place is an opportunity to discover, learn and study'.

The answers to this question show that RTD in practice is seen as typical design activities, which highlights a different interpretation of RTD in practice than in a scholarly sense. A more accurate/rigid designing–testing process, such as comprised in RTD, holds the potential to ensure more valid and robust design products, and it can lead to a fair level of innovation in disciplines such as urban design (Forsyth 2007, 461) or landscape architecture.

Analysis of co-occurrences

This section presents the results of the analysis of co-occurrences of codes by reference to the person-, practice- and academia-related meta-level codes presented above (Figure 7). The results show that there is a clear predominance of codes falling into the meta-level code 'practice-related' (56%), followed by 'academia-related' (33%) and, receiving the lesser codes, 'person-related' (11%).

Three codes across the different answer sets fall under two meta-level codes: the codes 'talking to stakeholders and experts' (question 1), 'policy and reports' (question 1), and 'raising and answering a question no one answered before' (question 2) can be linked to both the 'practice-related' and the 'academia-related' meta-level codes. This is because these practices and resources are frequently employed in both academia and practice. One code falls under the three meta-level codes: 'getting more insight on a topic' (question 3). While the answers obtained did not specify neither the nature of the topic (e.g., personal or societal relevance) nor the means to address it, this code refers to an aspect often fuelling personal-, practice- and academia-related investigations.

All meta-level codes receive codes from questions 1–3: 'person-related' receives three codes from question 1, two from question 2 and four from question 3; 'practice-related' receives eight codes from question 1, four codes from question 2 and three codes from question 3; 'person-related' receives one code per question. The allocation of eight codes from question 1 ('what are the sources of knowledge informing designs in your practice?') under 'practice-related' is the most striking outcome here.

Across the answers to questions 1–3, one can observe the co-occurrence of 'experimentalism' between questions 2 ('what does 'research' mean to you?) and 3 ('what does "research through design" (RTD) mean to you?'). Experimentalism is as much at the essence of RTD in a scholarly sense as of design practice. In the absence of a clear mention to accurate testing leading to evidence, and considering the emphasis placed on intuition/instinct in the answers obtained for question 3, experimentalism can herewith be considered as referring to the common exploration of design alternatives with different mediums, which falls out of the RTD in a scholarly sense. There is also a latent overlap between 'methodological framework based on a research question' (question 2) and 'testing and adjusting options in a systematic/iterative manner' (question 3).

In line with the observations made above for each question, these results suggest that the meaning of RTD in practice is associated more to practice-related factors than to scholarly RTD. None of the claims of applying RTD in practice (question 4) is followed by the mention to any component of the scholarly RTD set-up (question 5). The description

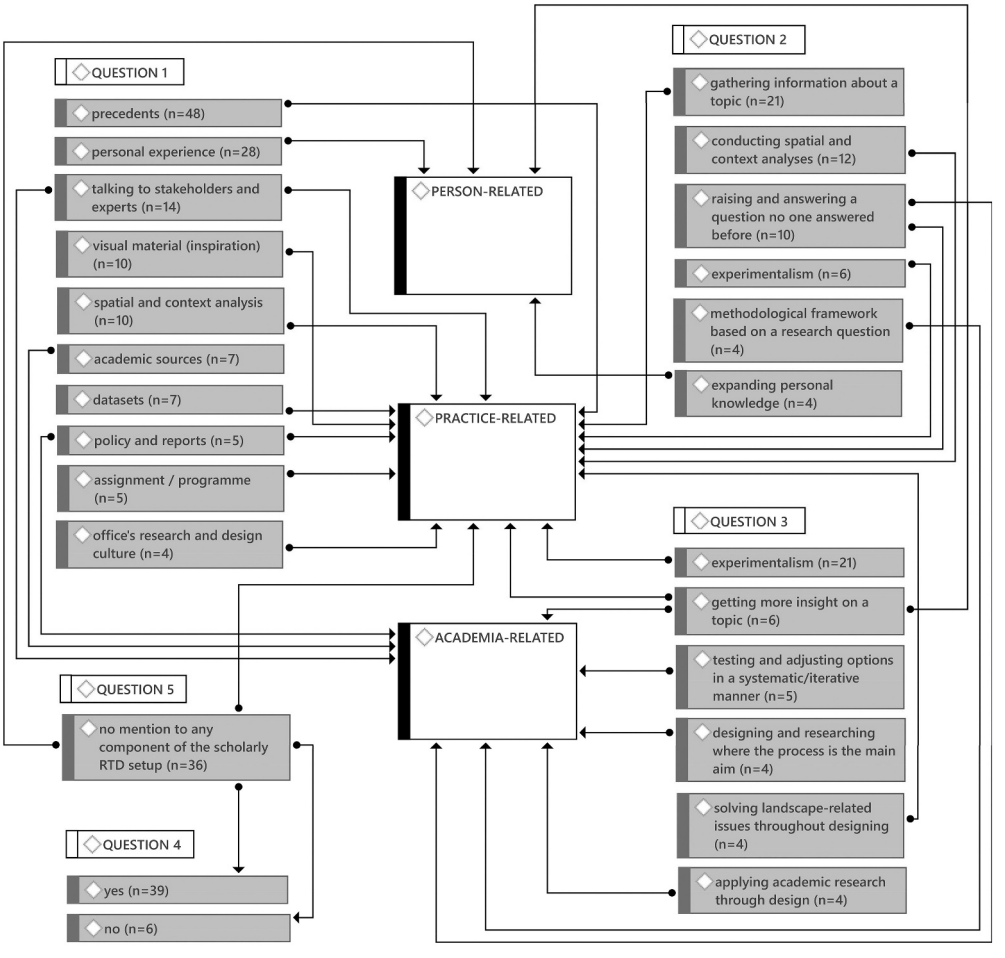

Figure 7. Results obtained with the analysis of co-occurrences of codes performed with ATLAS.ti.

of projects provided in question 5 encompasses considerations mostly falling under the meta-code 'practice-related', followed by 'person-related'. An example of the former is 'we have tested massive numbers of options only for the paving pattern' and, of the latter, 'in designing you always try to come from slightly different perspective and then you have to challenge yourself'. These results are in line with the predominant observation of practice- and person-related answers given to questions 1–3. Many answers included, for example, 'precedents', 'talking to stakeholders and experts' or 'assignment/programme'.

However, the results of the analysis of co-occurrences also suggest that academic-related factors are not absent from the mind of practitioners, which is in line with some of the answers obtained for questions 2 and 3. It is interesting to note that one interviewee indirectly mentioned components of scholarly the RTD set-up in question 5. This interviewee defined RTD as 'testing and adjusting options in a systematic/iterative manner' (question 3), chose for 'yes, at a basic level' in question 4, answered question 1 with

'precedents' and question 2 with 'gathering information about a topic'. This is an example of how, despite the different meaning of RTD observed between academia and practice, there seems to be latitude for the integration of research-based procedures in practice.

The analysis of results indicates clear differences in interpreting the meaning of RTD between practice and academia. RTD in design practice generally seems to focus on experimenting with different design options, which are usually not tested in an accurate way. Yet, employing more 'scholarly' RTD in practice could enhance the validity and robustness of design products because RTD is a structured, evidence-based methodology combining scientific testing and creative design. While it is reasonable to admit that 'not every design activity can or should be considered a research inquiry focused on discovery' (Nijhuis and de Vries 2019, 88), practitioners would benefit from 'interrogating and testing theories in a nimble manner' (Inam 2011, 276). When there is flexibility amongst practitioners for the integration of more research-based knowledge and methodologies in practice, this could help reducing the gap between the meaning of RTD in academia and practice.

Overseeing the different interpretations or 'RTD', one might derive that the terminology used for the different processes in academia and practice does not adequately reflect the different activities linking design and the acquisition of knowledge. For instance, quests to gain new knowledge in practice by using heuristics as a testing tool do not fall under the term 'research', which has a rather academic connotation. Given that context, perhaps the definitions given by Zeisel (2006) on 'inquiry by design', which are less rigid, would capture the design process in practice better.

Limitations

This study is limited to the results obtained with the interviews carried out across nine Dutch urban and landscape design offices. A wider study, or one conducted in different offices and countries, could have resulted in a different set of data. In addition, the results of the interviews reflect the ideas/experiences of some members of each office, and not necessarily of the whole office's staff. Therefore, the results presented should not be regarded as an attempt to provide any portrait of the offices involved or a sketch of the worldwide situation.

Conclusions

What is the meaning of RTD in Dutch urban and landscape design practice? This study answers this question by pointing out that the term 'RTD' in urban design and landscape architecture practice refers mostly to typical procedures and resources of a practical design process. The results of this study show that precedents and personal experience are main sources of knowledge informing designs in practice and that 'research' means to practitioners mostly the gathering information about a topic or the elaboration of spatial and context analyses. In practice, RTD is mostly seen as experimentalism, without a conscious and transparent approach with accurate testing procedures to warrant internal and external validity to design products. Although practitioners may claim to conduct RTD, these claims do not seem to refer to a scholarly RTD set-up.

Scholarly RTD offers practitioners the chance to create more valid, and thus reliable, design products through the rigorous testing of designs. The transparent and evidence-based design decision-taking process warrants a robust argumentation in public debate. Missing out this chance might lead to distrust in the products of urban and landscape design at a time when major challenges, such as dealing with climate or demographic change, call for reliable spatial design solutions.

Based on the findings of this study, it is recommended in the first instance to increase the use of academically sound RTD in urban and landscape design practice, in so far as the project budget and brief allow it. This requires a close cooperation and bilateral communication between academia and practice around knowledge and value creation on RTD. The education of future practitioners can play a pivotal role in the widespread employment of scholarly RTD in urban and landscape design practice.

Second, whenever employing RTD is not feasible or not desired, it is recommended to differentiate between the use of the term 'RTD', which should keep its scholarly nature, and the different qualification of the process of acquiring design knowledge in practice. Such process, being less rigid than in academia, particularly regarding the employment of testing methods, would better be called 'inquiry by design' than RTD.

Although this study was conducted in the Netherlands, its outcomes might be applicable elsewhere, as none of the issues identified regarding the relationship between scholarly and practical RTD is per se specific to the Dutch reality. This is to be confirmed by future research.

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