

Demystifying the Arduous Doctoral Journey: The Eagle Vision of a Research Proposal

Rahinah Ibrahim

Universiti Putra Malaysia, Selangor, Malaysia

rahinah@putra.upm.edu.my

Abstract: In fast-paced business organisations, there is critical need for conducting systematic research in order to explain and solve recurring problems in the industry. However, we find many building professionals losing their patience over the unknown end of a doctoral study as most of them practise problem-solving in their jobs since they were so trained. The purpose of this article is to present a visualisation tool developed by a built environment faculty to explain a typical three-year journey that mature building professionals are required to take for solving their own research inquiries. We claim that if these mature students are given a quick overview on how and what their doctoral journey would involve at the start of their studies, they will be less fearful of uncertainties and will accordingly fulfil the requirements of their doctoral studies successfully. The Eagle Research Design Table (Eagle Table) is a self-filled tool guided by three research question's constructs. The key to expanding the Eagle Table is identifying these constructs in a research inquiry first. We have established three constructs—"WHO", "WHAT" and "HOW"—through prolonged participatory experience in teaching research methodology to building professionals. The "WHO" construct refers to the element or subject being used in, or impacted by, the study while the "WHAT" construct refers to the body of knowledge that is required to solve the research inquiry. The final "HOW" construct refers to the action to be taken on the element or subject during the study. In this article, we present how these three research question's constructs, when presented in a table form, proved to be successful in providing a quick overview of a doctoral study's journey. Hence, enabling many mature building professionals to persevere in their studies. Consequently, the academic community would benefit from the rich experience and wisdom of their industry partners in handling and tackling recurring problems in the built environment.

Keywords: research proposal design, research methodology, eagle table, dissertation, research framework, graduate study

1. Introduction

Many doctoral students in the field of environmental design join graduate studies with several years of professional practice and experience. Due to the obscurity in creating their individual new knowledge contribution, we found many doctoral students concentrating much on the research methodology instead of enjoying the journey of knowledge discovery. This vague and rather confusing start of a graduate life is risky when some students realise that graduate study is a challenging feat. As a result, many opted deferring their studies for a semester or more, or dropping from a programme after encountering a number of setbacks. This issue is critical since fast-paced business organisations have growing needs for conducting systematic research so as to explain and solve recurring problems in the industry. Despite the need for inoculating research into professional practices through formal graduate programmes, we have noticed over the years that many building professionals—who tend to be mature students—are losing their patience over the unknown end of a doctoral study as most of them act as problem-solvers in their jobs since they were formerly so trained. In teaching new graduate students how to prepare their research proposals, we realised in due time that if these mature professional students were provided from the beginning a quick overview of what their doctoral journey will involve, they will be less fearful of uncertainties and will accordingly fulfil the requirements of their doctoral studies successfully. In this article, we will first present the issues and concerns by graduate students, the background foundations of the Eagle Research Design Table (Eagle Table) and the step-by-step development of an Eagle Table. These are followed by steps on how to illustrate the design of an Eagle Research Workflow Framework and scheduling in the necessary time for each step within a typical three-year journey that mature building professionals will undergo to answer their research inquiries.

2. Issues and concerns of matured professional students

Here are several recurring issues and concerns voiced by our students during class discussions. Among them include:

2.1 What is my research problem?

“I want to do a survey about how people perceived their garden” or “I want to conduct an in-depth interview with the Malays to find out about their socio-cultural practices”. For experienced supervisors, we know that these statements do not provide explanations why students want to use either inquiry strategy to answer their research problems. In fact, supervisors should become concerned because instead of problem seeking at the initial research stage, graduate students concentrated much on how they should collect and analyse their data. Of course, the graduate students would become very defensive when their supervisors instructed them to change their inquiry strategies later.

2.2 What is the best topic to research?

“I am proposing a new system to improve a building’s sustainability in my field of study”. During class discussions, we often hear students aspiring to solve the world’s problems. At our faculty, sustainable themes are common in the last decade due to global warming issue. Each sustainable theme has multiple sub-topics for doctoral students to uncover. Novice researchers tend to “feel confident that this topic is big enough to get me a degree” and have misconceptions that the more complex a topic is, the better the guarantee for obtaining a doctoral degree.

2.3 What do I need to read?

“When I started my research, my supervisor told me to read about engineering technologies. When I asked how many articles and he/she told me as many as I can”. “How do I know what to read because each time I gave my supervisor my reading summary, he/she kept telling me to read more!” “When can I stop reading?” “I had spent so many weeks reading this topic and it is not fair for my supervisor to ask me to read another topic after telling me what I had just read was irrelevant! Why didn’t he/she tell me about this new topic in the first place!” “I have read so many articles and now I am so confused about what to use in my research!” Many doctoral students complained about being asked by their supervisors to read so many types of literature and topics before they could embark on their field work.

2.4 What inquiry strategy is best for my research?

Experienced supervisors would know that certain inquiry strategies are not suitable to support the data collection and analysis of data to answer certain research inquiries. It is very common to hear doctoral students say “I want to use survey because I was told it is the easiest way to finish my study on time”. “My supervisor cannot explain why this is not a good strategy” because it is always hard and wasteful of time to explain to graduate students on some matters they have yet to read and understand. Thus, we found students very upset when told to change their inquiry strategies.

2.5 When can I start my field work?

“My friends have gone to collect data. I am worried because my supervisor wants me to review more literature”. “How come my friends have started data collection and I haven’t started mine yet?” For some reason, we found many graduate students under pressure to “show” to their peers that they were progressing well on their theses when they are seen collecting data. Consequently, we have seen a number of studies where the research inquiries were changed to suit the results. We attribute this phenomenon to premature data collection when the research inquiry and its inquiry strategies were not well developed to allow meaningful data collection based on theoretical guidance.

2.6 Is this a doctoral work?

Often doctoral students ask supervisors “Are these materials enough for a doctoral degree?” “How, do I know it is enough?” “Are you sure?” “What are the differences between a Masters and doctoral studies?” “What is the new knowledge I will develop at the end of my doctoral study?” “Is it possible not to obtain any new knowledge?” Many supervisors have also been frequently asked how they could differentiate a masters’ research question from a doctoral one.

2.7 What am I going to do?

“I talked to many people and everyone gave me different answers to the same question!” “I am so confused and don’t know where to start”. “Where should I start first?” “Why is there many different ways of doing what I would like to do?” “There is too much reading. Why can’t I just provide the design

solutions like I did in my practice?” We found many graduate students very confused about what to do next when they had so much information.

2.8 Can I finish on time?

“Research is a very difficult process”. “I am scared to fail”. “I cannot find sufficient literature on the subject. Where do I get them?” “I am on a 3-year scholarship study leave. I have to finish on time because I have to return to work afterwards”. We found many students very worried whether they could complete their studies within their stipulated time table.

3. The Eagle Research Design Table

The above common issues are typical challenges supervisors have to deal with their respective students at the start of their doctoral studies. The article now describes how the *Eagle Research Design Table* (Eagle Table) is used to provide an eagle’s view of the overall research framework and process by linking all the necessary research ingredients for that three-year journey. The table was initially developed by Ibrahim (2008) based on continuous feedbacks from teaching of, and learning about, designing a doctoral research proposal. It was collected over nine semesters involving more than 100 graduate students in the environmental design fields at Universiti Putra Malaysia. Using the visual communication method which is common to design researchers, the Eagle Table presents an approach to design a doctoral research proposal by documenting major components of a research proposal by first determining its main research question. We describe below the main components of the Eagle Table. They include definitions of the research questions’ (RQs) constructs, description of a construct, sub-research questions (Sub-RQs), research objectives (ROs), strategies of inquiry, expected research outputs and expected knowledge contributions.

3.1 Definition of constructs of a research question

In the original work of Ibrahim (2008), she defined the research question (RQ) as an inquiry that leads towards obtaining a solution through systematic and verifiable steps conducted by a researcher. Therefore, we further define theory as a statement of rule regarding a phenomenon obtained through a systematic and verifiable inquiry. For this instance, an inquiry leading to a “yes” or “no” answer is not recommended as such inquiry will not need any systematic or verifiable steps. Before explaining how we design the research framework, we will first describe these earlier constructs as defined by Ibrahim (2008) as follows:

- 1) “WHO” is the “element” used in or impacted by the study.
- 2) “WHAT” is the “body of knowledge” which the researcher must know in order to solve the problem.
- 3) “HOW” is the “action” taken or the “impact” that will take place on the “element” or the “body of knowledge” in the study.

In this article, we would like to continue demonstrating how these constructs will guide design researchers in formulating their research sub-questions, research objectives and appropriate strategies of inquiry by using the Eagle Table. As a rule of thumb, Ibrahim (2008) recommended one of each construct for an acceptable Masters’ RQ. Since there is a need to develop an inquiry that will lead to new knowledge contribution, an approach that warrants such discovery in a doctoral study is when two bodies of knowledge merge to form an ontological solution to the research problem. Another approach is when two different actions or impacts are integrated to form an axiological solution to a research problem. Hence, Ibrahim suggested that an acceptable doctoral RQ should consist of at least two “WHATs”, one “WHO” and one “HOW” respectively. Another alternative is having two “HOWs”, one “WHAT” and one “WHO”. We support Ibrahim’s (2008) notion in that there should only be one “WHO” in any research inquiry in order for design researchers to have a focused “element” or “body of knowledge” being used or impacted by the study. We restate the example of a doctoral RQ from Ibrahim (2008) using this approach:

How can 3D sketching _[WHAT1] be utilised in VR tools _[WHAT2] for enhancing collaboration _[HOW] among non-collocated design team members _[WHO]?

or,

How can 3D sketching be utilised ^[HOW1] in VR tools ^[WHAT] for enhancing collaboration ^[HOW2] among non-collocated design team members ^[WHO]?

3.2 Construct description

We have established the description of each construct in the research inquiry that is useful for directing design researchers as to where to head for their preliminary literature surveys. For example, “3D sketching” will require the design researcher to review literature on the architectural design process, sketching methods and tools, etc. Another instance, “enhancing collaboration” will require the design researcher to review literature on methods or tools for enhancing collaboration during the design process. Table 1 demonstrates—using Ibrahim’s (2008) first example on a doctoral RQ presented above—how we identify and describe a construct. Then, we show how research sub-questions can be formulated using the Eagle Table approach.

Table 1: Identifying constructs, formulating research sub-questions and determining research objectives (adapted from Ibrahim (2008))

Construct	Description of Construct	Research Sub-Questions (Sub-RQ)
[WHAT1]	3D Sketching	<p><u>SUB-RQ1:</u> How do designers conduct 3D sketching during collaborative meetings?</p> <p><u>RO1:</u> To document how designers are currently sketching during collaborative meetings.</p>
[WHAT2]	VR Tools	<p><u>Sub-RQ2:</u> What are the virtual reality (VR) operating characteristics of non-collocated project teams?</p> <p><u>RO2:</u> To understand the operating characteristics of non-collocated collaboration using VR tools.</p>
[HOW]	Enhancing Collaboration	<p><u>SUB-RQ3:</u> What are the key enablers for using 3D sketching collaboration in VR?</p> <p><u>RO3:</u> To recommend how a non-collocated design team can use VR tools to support their collaboration meetings.</p>
[WHO]	Non-Collocated Design Team Members	<p>Note: This sub-RQ has a secondary priority when the design researcher has experienced such collaborative design experience. Therefore, it suffices to cover this aspect when discussing the problem statement.</p>

3.3 Research sub-questions (sub-RQ)

Moving further to the right side of the Eagle Table (see Table 1), we posit that at least one “thinking” or “active” research sub-question (sub-RQ) should be developed for each construct. These sub-RQs would lead to the intended output in the next few steps. For example, the sub-RQ for the first construct must relate on “3D sketching”. Here, the design researcher would phrase his first sub-RQ1 as “How do designers conduct 3D sketching during collaborative meetings?” By answering sub-RQ1, the design researcher is guided to seek information about the method and process of sketching during collaborative design sessions.

3.4 Research objectives

We posit that a better control over the limitation of a doctoral study is achievable if the design researcher determines his/her research objectives later after he/she has the sub-RQs. Using the same sub-RQ1 example of “How do designers conduct 3D sketching during collaborative meetings?”, the graduate student can limit his/her doctoral study to documenting how designers are currently sketching during collaborative meeting sessions. Using the Eagle Table, the student will state the research objective(s) for each sub-RQ he/she has developed by placing its objective(s) below the respective sub-RQ(s).

3.5 Strategy of inquiry

As per Ibrahim (2008), we followed Yin’s approach (Yin, 2003) as a reference for specifying an inquiry strategy as we found this approach provides a quick reference for design researchers to identify an inquiry strategy. The summary from Yin (2003) is reproduced in Table 2 below for quick reference purposes.

Table 2: Relevant situations for different research strategies (source: Yin (2003))

Strategy	Form of RQ	Requires Control of Behavioural Events	Focuses on Contemporary Events?
Experiment	how, why?	Yes	Yes
Survey	who, what, where, how many, how much?	No	Yes
Archival analysis	who, what, where, how many, how much?	No	Yes/No
History	how, why?	No	No
Case study	how, why?	No	Yes

Referring to one of the examples taken from Ibrahim (2008), the main RQ starts with a “How.” Therefore, Yin (2003) advised his reader to either use experiment or case study as his/her inquiry strategy. If there is more than one option, the supervisor would then advise design researchers to evaluate their Sub-RQs for guidance on which specific methodology to utilise. Sub-RQ1 starts with a “How” while Sub-RQ2 and Sub-RQ3 start with a “What.” For Sub-RQ1, the design researcher is better off to choose conducting a case study of an architectural design studio where ethnography is the dominant data collection procedure. The design researcher would use ethnography to know how designers conduct 3D sketching during collaborative meetings. This strategy is supported by the fact that he/she cannot control the behavioural events during data collection. On the other hand, the second Sub-RQ allows the design researcher to choose a controlled experiment in a laboratory since it will be difficult to collect data on non-collocated project teams in Malaysia. Additionally, this option is recommended in order to reduce the design researcher’s risk since there are not many architectural firms in the country which have virtual reality tools in their offices. For the final Sub-RQ (Sub-RQ3), the design researcher could conduct an analysis that integrates results obtained from the ethnography case study and the controlled experiment (Ibrahim, 2008). The main strategy of inquiry for each Sub-RQ is recorded in the cell on the right side of each Sub-RQ as illustrated in Table 3.

Table 3: Determining inquiry strategies, identifying research outputs and knowledge contributions

Research Sub-Question (Sub-RQ)	Strategy of Inquiry	Expected Output	Expected Knowledge Contribution
<p><u>Sub-RQ1:</u> How do designers conduct 3D sketching during collaborative meetings? <u>RO1:</u> To document how designers are currently sketching during collaborative meetings.</p>	Literature survey/ Ethnography	<u>Output 1:</u> Method and process of sketching during collaborative design sessions	<u>Knowledge 1:</u> Theory on sketching preferences among local design professionals
<p><u>Sub-RQ2:</u> What are the virtual reality (VR) operating characteristics of non-collocated project teams? <u>RO2:</u> To understand the operating characteristics of non-collocated collaboration using VR tools.</p>	Experiment	<u>Output 2:</u> VR operating characteristics of non-collocated project teams	<u>Knowledge 2:</u> Theory on VR operation for non-collocated local design professionals
<p><u>Sub-RQ3:</u> What are the key enablers for using 3D sketching collaboration in VR? <u>RO3:</u> To recommend how a non-collocated design team can use VR tools to support their collaboration meetings.</p>	Experimental data analysis	<u>Output 3:</u> Recommendations on key enablers for non-collocated design teams to use VR tools.	<u>Knowledge 3:</u> Recommendations on key enablers for non-collocated design teams to use VR tools.

3.6 Expected research outputs

Once a design researcher has identified his/her main inquiry strategy, he/she should determine what would be the ultimate inquiry results. Using the same example from Ibrahim (2008), the design researcher would be expected to document the method and process of sketching during collaborative design sessions from his/her literature survey and ethnography activities. According to the final inquiry strategy, the same design researcher would be expected to make several recommendations on key enablers for non-collocated design teams to use VR tools based on the conducted experiment(s).

3.7 Knowledge contributions

We should notice that when using an ethnography methodology—a constructivist’s qualitative method of inquiry—a design researcher is expected to develop a theory as a conclusion of his/her analysis (Creswell, 2009). Therefore, we expect the respective design researcher to develop a theory on sketching preferences among local design professionals that would be his/her first doctoral knowledge contribution. Additionally, the design researcher would be able to reaffirm the earlier ethnography theoretical proposition when he/she conducts his/her experiment following the Sub-RQ2 requirement. On the contrary, the design researcher would then use a post-positivist’s approach to validate his/her ethnography-based theory through confirmation of the hypothesis/es which he/she had to develop for the experiment.

4. Summarising the ingredients of a doctoral research

Table 4 combines information from Tables 1 and 3 to form a complete Eagle Table example. At this point of preparing the Eagle Table, design researchers are advised to review the expected sequential steps they have to conduct to complete their research. For instance, if the inquiry strategy for construct [WHAT2] has to be completed first as opposed to construct [WHAT1], then design researchers are advised to relocate the row for construct [WHAT2] above the row of construct [WHAT1]. Another instance, if construct [WHO] is necessary to be understood first, then it should be at the topmost row then. Thus, the rows in the Eagle Table are not confined to the sequence that design researchers obtain from their main RQs. With the following information in place, design researchers can refer to the Eagle Table for designing the research workflow framework which will be explained in the next section.

Table 4: A complete Eagle Research Design Table outlaying the research sub-questions, research objectives, strategies of inquiry, expected outputs and knowledge contributions after the identification of the research question’s constructs

Problem Statement: There is a need to use IT/ICT by Malaysian building professionals for successful global project implementation.					
Main RQ: How can 3D sketching [WHAT1] be utilized in virtual reality (VR) tools [WHAT2] for enhancing collaboration [HOW] among non-collocated design team members [WHO]?					
Construct	Description of Construct	Research Sub-Question (Sub-RQ)	Strategy of Inquiry	Expected Output	Expected Knowledge Contribution
[WHAT 1]	3D Sketching	Sub-RQ1: How do designers conduct 3D sketching during collaborative meetings? RO1: To document how designers are currently sketching during collaborative meetings.	Literature survey/ Ethnography	Output 1: Method and process of sketching during collaborative design sessions	Knowledge 1: Theory on sketching preferences among local design professionals
[WHAT 2]	VR Tools	Sub-RQ2: What are the virtual reality (VR) operating characteristics of non-collocated project teams?	Experiment	Output 2: VR operating characteristics of non-collocated project teams	Knowledge 2: Theory on VR operation for non-collocated local design professionals

		RO2: To understand the operating characteristics of non-collocated collaboration using VR tools.			
Construct	Description of Construct	Research Sub-Question (Sub-RQ)	Strategy of Inquiry	Expected Output	Expected Knowledge Contribution
[HOW]	Enhancing Collaboration	Sub-RQ3: What are the key enablers for using 3D sketching collaboration in VR? RO3: To recommend how a non-collocated design team can use VR tools to support their collaboration meetings.	Experimental data analysis	Output 3: Recommendations on key enablers for non-collocated design teams to use VR tools.	Knowledge 3: Recommendations on key enablers for non-collocated design teams to use VR tools.
[WHO]	Non-Collocated Design Team Members	Note: This Sub-RQ has a secondary priority when the design researcher has experienced such collaborative design experience. Therefore, it would suffice to cover this aspect when discussing the problem statement.	N/A	N/A	N/A

5. Visualising the Eagle research workflow framework

We now move on to design the research workflow framework. With reference to the established Eagle Table, design researchers are now guided to draw their research framework thus forming a workflow that could be integrated with their time schedule.

5.1 Linking text to graphical framework

The next step requires the design researcher to draw in the inquiry strategy presented at the right side of the Eagle Table. For example, Sub-RQ1 leads to an ethnography methodology; Sub-RQ2 leads to an experimental approach while Sub-RQ3 leads to an analysis of both. Since the experiment follows the ethnography activity, that combination represents a sequential mixed-method research methodology. Then, the design researcher can fill in the remaining components of the research proposal like the problem identification, validation and expected outcome. Since the proposed research proposal example starts with an ethnography activity, the literature survey forming a typical research proposal is conducted concurrently. Literature survey would otherwise precede most established inquiry strategies. Figure 1 illustrates how the design researcher may link the strategy of inquiries together and completes the remaining components of the research methodology for his/her research proposal.

5.2 Checking and reviewing the research process flow

For the purpose of checking the accuracy of relationships between the main components of a research proposal, design researchers are recommended to review each Sub-RQ and ascertain whether its output is relevant or not for answering the main RQ. If there is any weak relevancy, design researchers are recommended to review and revise the respective Sub-RQ and this will “force” him/her to perform a research activity that we can expect produce the targeted output effectively. Additionally, we find that recommendations and guidelines are generally linked to an analysis step. In many instances, too, the validation of an experiment will produce a tangible prototype as its output. Visualising the expected research outputs and their knowledge contributions is illustrated in Figure 1.

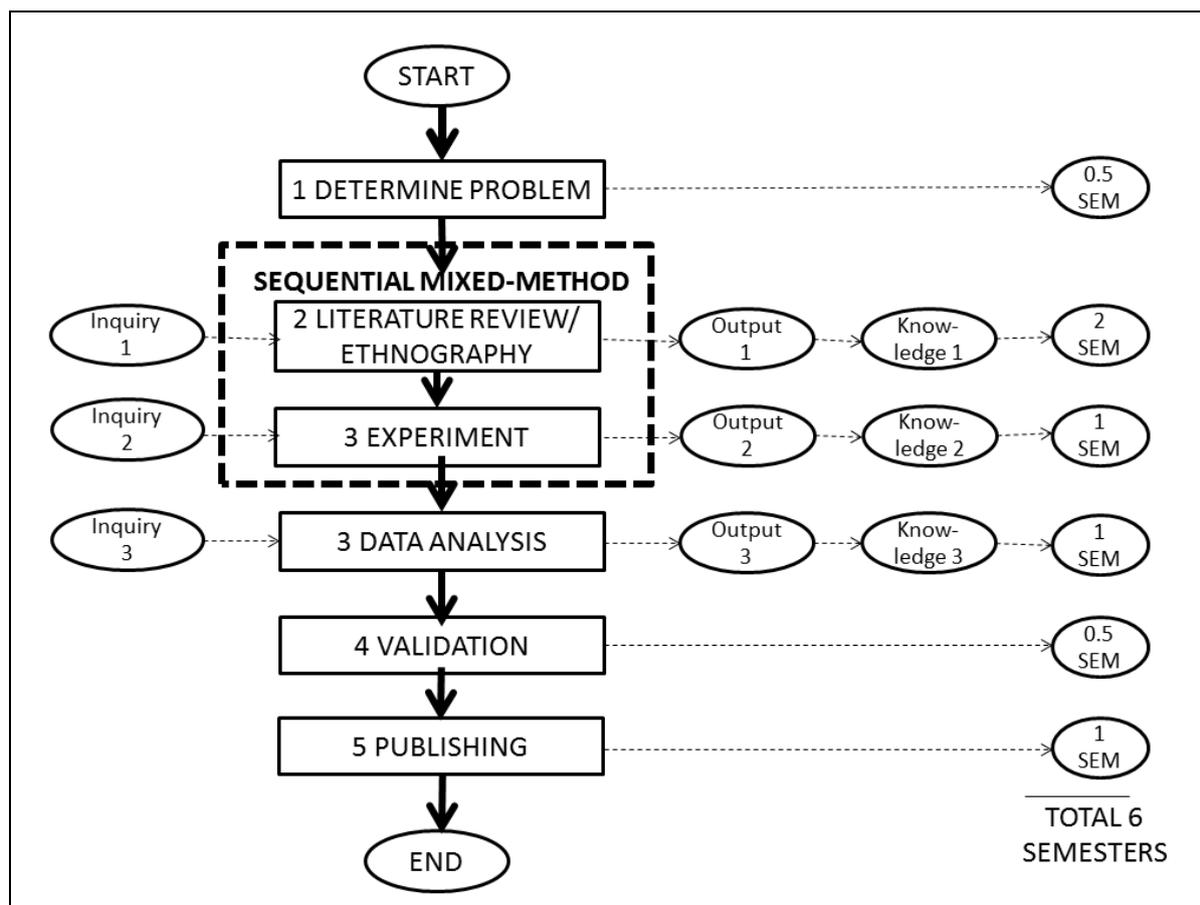


Figure 1: Design of a research workflow framework based on the Eagle Table

5.3 Time schedule

Upon completion of the research proposal’s workflow, design researchers can indicate the amount of time (for example, one semester or half semester) needed to complete each task. A guiding timeline is indicated next to each major task in the research framework. In the example in Figure 1, we assigned time for each task according to the typical average length of time based on typical supervisors’ experience in supervising graduate students. We always could see, at this point in designing a research workflow framework, many of our design researchers drew sighs of relief since they could now better visualise the number of tasks and sequence of activities necessary to finish their doctoral studies within their stipulated study time. The question then is whether or not those students are willing to perform the due tasks within the stipulated time.

6. What is after the Eagle Table

We found the adoption of the Eagle Table approach—as early as the first week of joining a graduate study—was very useful to graduate researchers. Since there are a growing number of well-established research methodology books for different types of inquiry strategies, our design researchers are recommended to refer to them once they have identified their main inquiry strategy. Of these include Groat and Wang (2002), Creswell (2007), Yin (2003) and Zeisel (2006) in the design fields. Since the granularity of a research focus depends on extant literature review (Ibrahim 2008), we recommend all design researchers to continuously update and upgrade the Eagle Table as and when necessary throughout their research. Hence, we would like to emphasise the need for researchers in continuously refining their main RQs and Sub-RQs within the framework of their constructs’ descriptions as their doctoral theses progress. We found as consequence our design researchers drawing up more specific descriptions for their respective RQ constructs. For instance, the “IT tool” became a “VR tool” after intensive and more focused literature survey in our particular example.

7. Validation

The author had conducted a random survey via email among the graduate students (both at Masters and Doctoral levels) and colleagues who were preparing their research proposals for doctoral studies in years 2010 and 2011 to determine the effectiveness of using this Eagle Table as a guide in developing their research proposals. The respondents had been exposed to the Eagle Table either through an official coursework at the faculty or in special short courses for preparing research proposals. A total of 19 (35%) from a sample population of 54 students and staff responded to the call for feedbacks. The survey hypothesised that the Eagle Table would improve the respondents' confidence level about when they could complete their graduate studies after they have been systematically exposed to how each research components is related to one another.

The survey instrument consisted of 10 questions covering their levels of confidence on pursuing their graduate studies before and after being exposed to the Eagle Table. Additionally, the survey also seeks which factors are influencing the confidence level after the Eagle Table course. A final question on which year each respondent took the course was also listed. For each question, each respondent was asked to rate his or her responses according to 6 levels of personal confidence in a Likert Scale format where "1" is "Totally Disagree", "2" is "Very Much Disagree", "3" is "Less Disagree", "4" is "More Agree", "5" is "Very Much Agree" and "6" is "Totally Agree". Reliability analysis on the data presents the Cronbach's Alpha value at 0.77. The questions and their corresponding results are presented in Table 5.

Prior to exposure to the Eagle Table, the respondents indicate a mean of 3.21 (SD = 1.08) confidence level compared to a mean of 5.10 (SD = 0.81) afterwards. The results reflect less disagreement on their confidence about how they could complete their theses at the start of their studies compared to being very much agreed on having their confidence to complete their theses within 3 years after their exposure.

The results regarding various aspects of a typical research proposal highlights the strength of completing an Eagle Table exercise very early during their graduate studies. They show very much agreement on understanding their research components in the areas of identification of research problem (Mean = 5.05, SD = 1.03), having a good research question (Mean = 5.10, SD = 0.88) and having good research objectives (Mean = 5.26, SD = 0.81). Additionally, the results show more agreement in knowing which body of knowledge one has to survey (Mean = 4.89, SD = 0.88), understanding about having an appropriate inquiry strategy to collect and analyse data (Mean = 4.63, SD = 0.83), knowing what results they could expect (Mean = 4.68, SD = 0.75) and knowing what knowledge contributions they could obtain (Mean = 4.79, SD = 0.79).

Table 5: Graduate students' confidence level after their exposure to the Eagle Research Design Table

NO.	DESCRIPTION	MEAN (SD)
1.	At the start of your thesis study, you are very confident about how you can complete your thesis.	3.21 (1.08)
2.	After you have completed the Eagle Research Design Framework Table, 2.1 You have identified your research problem. 2.2 You know you have a good research question. 2.3 You know your research objectives. 2.4 You know which body of knowledge you need to know to focus on your literature survey. 2.5 You know which inquiry strategy you can use to collect and analyse your required data. 2.6 You know the expected results you can get after your analysis is completed. 2.7 You know the expected knowledge contributions you can obtain from your thesis.	5.05 (1.03) 5.10 (0.88) 5.26 (0.81) 4.89 (0.88) 4.63 (0.83) 4.68 (0.75) 4.79 (0.79)
3.	After you have completed the Eagle Research Design Framework Table, you are confident about how you can complete your thesis within 3 years.	5.10 (0.81)

Note: N = 19; Population = 54

Further analysis of data indicates that all research components are influential in increasing the participants' confidence level (R = 0.79). However, the most influential factor is the *research question* which has a significant value of 0.005. In general, respondents know what their research problems

are, know their respective research questions and know their research objectives. A good comprehension of these three would lead them to better understand which body of knowledge to read in-depth, what inquiry strategies to use besides knowing what results and knowledge contributions could be expected at the conclusion of their studies. In traditional doctoral studies, the graduate students would obtain these latter components after they had conducted critical literature survey on the respective bodies of knowledge. Hence, the survey's results support that the Eagle Table improves the respondents' confidence level about when they could complete their graduate studies after they were systematically exposed to how each research components are related to one another in one visualised table.

8. Discussion and conclusions

We have illustrated how the Eagle Table assisted graduate students to develop their confidences to complete their doctoral studies. The article now explains how the Eagle Table overcame the issues and concerns of mature professional students we highlighted in Section 2 earlier.

Identifying the research problem. The three constructs—*who*, *what* and *how*—are only developed after the mature professional students have resolved their research problems. The insistence of non-inquiry strategy responses helped them to focus on the actual problem. Continuously asking why to each problem statement is suggested in order to reach one that could no longer answer the question.

Limitation of study. The Eagle Table recommended the mature professional students to determine their research questions before they determined their research objectives. Doing so had enabled them to scope and limit their theses to a level that commensurate their research inquiries.

Literature focus. The three RQ's constructs highlighted the areas of concentration where the mature professional students would start their initial literature survey. For a doctoral study, there would be at least four bodies of literature to cover compared to three for a Masters study. These students would then look forward to review the necessary literature without fear of being given a turnaround later.

Inquiry strategy. The quick references to either Yin (2007) or Cresswell (2003) explained why the mature professional students have to utilise certain inquiry strategy due to their research question. Based on similar references, these students were able to modify their research questions which enabled them to utilise their preferred inquiry strategy.

Research workflow. The arrangement of the inquiry strategy approach for each sub-RQ assisted mature professional students to design a research workflow framework. The framework enabled them to visualise and relate all aspects of the research components thus provided a quick reference to the whole thesis process.

Knowledge contribution. The Eagle Table guarantees the mature professional students at least one new knowledge contribution to current body of knowledge in their respective fields. Requiring either two "WHATs" or two "HOWs" clearly forced these graduate students to integrate either two bodies of knowledge or two respective processes in order to develop their inquiry solutions.

Systematic steps to complete thesis. The Eagle Table visualises the overall steps mature professional students would undertake in order to fulfil their respective doctoral research components and requirements. It provides a visual reference on how to complete their thesis journey in a systematic manner.

Successful doctorate study. The Eagle Table allows the matured professional students to allocate the required time to complete their theses. They would know that they have to instil self-discipline on top of hard work to see to the completion of their doctoral studies.

At Univesiti Putra Malaysia, students were given a maximum of 5 semesters to pass their Comprehensive Examination which covers details of the above research components. The Eagle Table provides the opportunity to graduate students how to plan their schedule accordingly. The feeling of satisfactory is claimed to have emerged when these graduate students know very well that they are in control of the whole thesis process as opposed to the initial unknown uncertainties. The results support the author's claim that knowing what to expect in their graduate studies as early as

possible is key to ensuring matured professional students to complete their graduate studies within the stipulated time.

In conclusion, this article shares how a built environment faculty guided mature design professionals to overcome the initial confusion and challenges of uncertainties about doctoral research. With an initial introduction to the roughly long and challenging doctoral journey, design researchers will feel less fearful of the unknown as this introduction enables them to develop an eagle's view of their three-year doctoral process. Although the use of the Eagle Table is still limited to our faculty, it has the potential for usage in other fields where professionals and practitioners require supplementary scientific-approached innovations in order to solve existing and recurring business problems. To date, the Eagle Table is recommended as a tool for starting a research prior to conducting extensive literature survey. Furthermore, it is recommended as a principal guide for focusing on development and refinement of selected theoretical constructs later in their respective studies. Thus, the Eagle Table is expected to evolve and become the beacon of light to an otherwise doctoral journey that may end to nowhere.

This article shares with the scientific community how design researchers may develop and design a doctoral research framework based on their main RQs. The three constructs drawn from the main RQ will facilitate the development of active Sub-RQs, research objectives, expected outputs and determine the most appropriate inquiry strategies. The information is summarised in an Eagle Table to facilitate design of the research workflow framework for the whole doctoral study. Based on the visualised Eagle Research Workflow Framework, the graduate students can estimate the time needed to complete their doctoral studies. This article extends Ibrahim's Eagle Table (Ibrahim, 2008) to include expected outputs and knowledge contributions, besides illustrating how design researchers may visualise their research design frameworks without missing the attributes of a good quality research. Additionally, the main purpose of the Eagle Table is to allow design researchers more time in refining their research methodologies through more focused literature survey without missing the orientation towards the end of their doctoral research journeys. The Eagle Table has now become a convenient tool that supports design supervisors in conveying their tacit knowledge about the doctoral research process. Therefore, having a beacon of light to guide the doctoral research is much better than changing the initial research methodology, or worse, changing the main RQ when the collected and analysed data are deemed inappropriate or satisfactory for concluding a doctoral thesis. Our ultimate goal is to retain and successfully graduate as many industry practitioners as possible, who will eventually become the industry links with academia.

Acknowledgements

The authors acknowledge the contribution of graduate students enrolled in the "Research Methodologies in Design (RSB5001)" course from Semester 1, 2006/2007 to Semester 1, 2010/2011 at Universiti Putra Malaysia. The author thanks Ina Krisantia for her contribution in this paper.

References

- Cresswell, J.W. (2009) *Research design: Qualitative, quantitative, and mixed methods approach*, Sage Publications Inc., Thousands Oak.
- Groat, L. and Wang, D. (2002) *Architectural Research Methods*, John Wiley & Sons Inc., New York.
- Ibrahim, R. (2008) "Setting up the research question for determining the research methodology", *ALAM CIPTA, Intl. J. on Sustainable Tropical Design Research and Practice*, Vol. 3, Iss. 1, pp 99-102.
- Yin, R.K. (2007) *Case study research: Design and methods*, Sage Publications, New York.
- Zeisel, J. (2006) *Inquiry by Design*, Norton & Company Ltd., London.