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**INTO THE CHALLENGES OF ALIGNING KEY SECTIONS OF  
DOCTORAL DISSERTATIONS: COGNITIVE ANALYSIS,  
PEDAGOGICAL TOOLS, AND INSTRUMENT  
DEVELOPMENT**

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**ABSTRACT**

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Aim/Purpose	The purpose of this study is to introduce an instrument that contains a set of exercises intended to help doctoral students align the key sections of their dissertation document. The exercises are developed after providing cognitive analysis of the factors that make aligning these key sections challenging to many, and after discussing pedagogical tools that can be used to address these challenges.
Background	Writing doctoral dissertations is a formidable endeavor for numerous students. Among the myriad challenges that are faced is the issue of aligning key sections of the dissertation document. Students often struggle with conceptualizing the alignment among different sections of the various chapters of their dissertation. In this study, we introduce here an instrument that includes a set of exercises to help address the challenges of alignment in chapter one, before the issues spiral and addressing them becomes complicated.
Completion of Methodology	This paper reviews literature that discusses the underlying challenges that face the writing of doctoral dissertations in general and the alignment of the key sections in particular. It analyzes the cognitive factors that contribute to the challenges and examines the pedagogical tools that can be used to address these challenges. The review of the literature, the analysis of the cognitive, and the examination of pedagogical tools lead to the introduction of an instrument that

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	is designed to help address the challenges of aligning the key sections of doctoral dissertations.
Contribution	This paper presents an instrument with a set of exercises that are intended to help students align key sections of their doctoral dissertation document. This alignment step is crucial to the successful completion of dissertation documents and is best tackled early in the writing. Delaying alignment or worse, ignoring alignment altogether, can complicate the issue and lead to numerous extra steps and delays. Our developed instrument here can be used to tackle this issue of alignment from the beginning and throughout the writing and completion status of dissertation documents.
Findings	Students are often faced with challenges when aligning the key sections of a doctoral dissertation. They struggle with conceptualizing the alignment process. They often write each section separately, and independently of other sections of a chapter and a dissertation. However, sections of the dissertation document are interrelated, and each section affects the writing of other sections. For the successful completion of the dissertation, the sections need to be aligned, and it would be best if these issues are tackled from the beginning of the writing and throughout the writing of the dissertation.
Recommendations for Practitioners	A methodological approach to aligning the sections of a doctoral dissertation is crucial for the resulting treatise to be coherent and present a unified purpose that threads through each chapter consistently.
Recommendations for Researchers	We recommend that doctoral students follow the exercises we introduced in the instrument provided in this paper or take other similar approaches. Without such an approach, aligning the key sections of a doctoral dissertation will be challenging, the dissertation writing process will be more complicated, and the time necessary to complete it will lengthen.
Impact on Society	The findings of this research will help doctoral mentors/advisors as they guide students in aligning key sections of their doctoral dissertations.
Keywords	doctoral dissertation alignment, aligning sections of a doctoral dissertation, doctoral dissertation challenges

## INTRODUCTION

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A majority of doctoral students find writing their doctoral dissertations to be a challenging task (Goodman et al., 2020; McNabola & Coughlan, 2014; Okoli, 2015; Skakni, 2018). This is a well-established fact and is supported by statistics, analytical studies, and numerous research that provide reasoning for these challenges and discussions at length (Grant & Osanloo, 2016; Russell-Pinson & Harris, 2019). While the doctoral dissertation as a whole is considered difficult, certain sections in the dissertation pose more challenges. We repeat the word “sections” here to mean sections within chapters of the dissertation. As it is known that doctoral dissertation documents are divided into chapters and each chapter is divided into sections. The challenges of the dissertation begin with the writing of these sections and cascade into the completion of the chapters and the dissertation document as a whole.

Sections in the dissertation document require connection, linkages, and coordination with other sections in the same document. The word “alignment” is used in this paper as a synonym for these linkages, coordination, and connections. We make the case that sections of doctoral dissertations need to and must be aligned for the successful completion of a coherent and streamlined dissertation. Ensuring such alignment poses additional challenges at the cognitive level for many students (Bloomberg & Volpe, 2018).

Of a particular challenge to the writing of the dissertation, the writing of chapter one is faced with specific requirements for the inclusion of certain sections in the chapter that are deemed as “key sections” of the dissertation document (Newman & Covrig, 2013; Ocholla, 2022). These key sections need to (and must) be aligned in order to draw a clear picture of the direction of the dissertation, the problem it addresses, the goals intended to achieve, and the questions that it answers (Newman & Covrig, 2013). This kind of alignment is challenging for many students and results in delays, rewriting, rephrasing, and often incompleteness.

The purpose of this study is to develop an instrument that assists students in aligning the key sections of doctoral dissertations. By instrument, we mean a set of activities that include instructions, checklists, exercises, and phases in a step-by-step approach aimed at aligning the sections of a doctoral dissertation. The focus of our developed instrument will be on the key sections of chapter one as a starting point. While alignment is essential throughout the entire dissertation, chapter one incorporates sections that serve to lay the groundwork on which the entire dissertation is built. Additional exercises are presented in the appendix, and we make them available to mentors, advisors, and students to incorporate sections within the remaining chapters to align the full dissertation document.

## LITERATURE REVIEW

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In this section, we introduce a review of the literature that we used in order to complete the instrument that we used to present the instrument for aligning the key sections of doctoral dissertations. To facilitate the volumes of information we retrieved and present them in a helpful format, we divided our literature review into the following three sections:

First, we introduce general information about the completion of doctoral studies, what it entails, and the core sections of the dissertation document.

Second, we provide a cognitive analysis of what makes writing the doctoral dissertation a difficult task and makes aligning the key sections of doctoral dissertations a challenging mission.

Third, we introduce the pedagogical tools that are typically used to address challenges similar to those faced with the aligning key sections of doctoral dissertations.

### *ABOUT COMPLETING THE DOCTORAL STUDIES*

Students start their doctoral studies with an eye toward the completion of a terminal degree and earn the coveted title of “Dr.” (Lovitts & Wert, 2009). Students who enroll in doctoral degree programs are typically known for their prior academic achievements and they (the doctoral students) desire to earn a degree above what they have achieved hitherto (Hunter & Devine, 2016). Typical doctoral degrees are “research focused” and to earn them, the student is required to complete a research project, then write and defend their dissertation (Ellis & Levy, 2012). The doctoral journey can take different paths from start to finish depending on the program and the university (Breitenbach, 2019). But typical programs have the following steps in common (Choi, 2019):

- Taking and completing courses related to the doctoral program
- Completing and passing the comprehensive or qualifier exam
- Writing a research proposal and conducting research
- Writing and then defending their dissertation

Most of the students who start doctoral studies have track records of high achievements and successful completion of prior studies (Hunter & Devine, 2016). When these students start taking courses, they are assessed based on metrics that are familiar to them. They complete courses, take exams, and write papers following prescribed rubrics and with the supervision of a faculty and other activities that are familiar to them. They even take the comprehensive exam, and it does not seem to faze the doctoral students (Choi, 2019), because all the hurdles they must clear up to that point are familiar territory.

They then begin to venture into unknown terrain, with the writing of a research proposal, getting that approved, conducting independent research, analyzing the findings, and writing it all up. It is the writing stage that stumps many students (Boyce et al., 2019; Choi, 2019), and it is at this step a good number of students drop out of the doctoral program (Boyce et al., 2019). Instead of adding “Dr.” to their title, those students must then contend with the notorious “ABD,” demonstrating incompleteness of some sort. In and of itself, it is an impressive achievement, but it pales in comparison to the “Dr.” title (Lovitts & Wert., 2009).

### **About the dissertation document**

The dissertation writing stage could start differently for different doctoral programs. However, a typical start for the dissertation would be the student selecting a topic of research and focusing on it until all work prescribed for the dissertation is submitted and approved. This dissertation document in essence is then completed following specified standards, regulations, and conventions dictated by their program, their university, the other regulating writing standards, and accreditation authorities (Ali & Pandya, 2021; Bloomberg & Volpe, 2018).

A typical dissertation document contains five chapters, with each chapter divided into multiple sections. It is a basic concept that these sections have to be sequentially connected such that the resulting dissertation is a streamlined document (Grant & Osanloo, 2016). In other words, as the writing continues from one section to another and from one chapter to the next, the reader must not notice a gap, a void, or inconsistencies among the sections of the dissertation document (Golding, et al., 2014). Instead, the reader should see and read a seamless transition as they go from reading one section to the next and to the next. In other words, the work should be aligned.

Although the dissertation document could take different formats, typically and mostly a dissertation document contains the following five chapters (Bunton, 2005). Chapter One – Introduction, Chapter Two – Literature review, Chapter Three – Research methodology, Chapter Four – Research analysis, Chapter Five – Summary, implications, and conclusion.

In chapter one, we can find multiple sections, combined, the sections describe the justification for the study and the intended outcome of the study (Faryadi, 2018). Three sections are noted to form the “key sections” of doctoral dissertations (Newman & Covrig, 2013). These three sections are the research problem statement, research purpose, and research questions (Miles, 2019). The following describes each of these sections.

### **The research problem statement in dissertations**

The problem statement section in doctoral dissertations is about identifying a problem that the student intends to research, explaining the ramification of the problem, and spelling out issues that are faced by some particular community or society on account of this problem (Ali & Pandya, 2021). This section is supposed to describe, explain and clarify the problem, and provide evidence that what is described is a problem that is worthy of doctoral-level research, and spending months (and possibly years) of time and sweat researching, working, and writing on this problem is warranted. Multiple requirements complicate the writing of this section (Ellis & Levy, 2012). This has to do with the way a problem statement is phrased and with the way moving forward in clarifying and making it convincing that the reported problem is worthy of this research and worthy of writing a dissertation on this problem.

The issue gets more complicated when there is more than one cause to the effect being studied. When this happens, the study likely ends up selecting variables, interconnecting the variables with the possible causes, and establishing different hypotheses which complicated the issue further and making more challenging at the cognitive level (Miles, 2017).

### **The research purpose section in dissertations**

After defining the problem statement, the doctoral student typically describes the research project's main goals and discusses why they would like to research the topic. As with the problem statement section, in this section the student would write about the specific community or society that would find resolution from the results of their research – in other words, why is s/he conducting the study, and their contribution towards the issue described in the problem statement is discussed in the purpose section. Generally, the research method – quantitative, qualitative, etc. – is specified in this section, along with a link to the discipline, degree, or program of the study. One more point, this section has to be consistent/congruent and aligned with what was/is listed in the section of the research problem statement. The student is expected to provide compelling evidence that their research would contribute to knowledge and that their purpose for conducting this research has a societal relevance (McNabola & Coughlan, 2014).

### **The research question(s) section in dissertations**

This section is about asking the questions posed by the study. In other words, the question will determine the outcome of the research. The question(s) have to be connected to the research problem statement as well as to the research purpose. In other words, the research question(s) needs to be initiated from the reading of the problem statement and the research purpose.

The phrasing of the question is important (Lim et al., 2015; Wisse & Roeland, 2022). Will the question answer the research problem? Is the question stated such that it can be answered via the method specified in the research purpose section? For example, answers to questions that use words such as “feeling” may be best answered by qualitative methods, while “to what extent” are appropriate for quantitative research. So, the question then must match the intended method. Frequently, students make the mistake of presenting a statement instead of a research question. So, does it read like a question? Is there a question mark at the end? Questions must frame the research, so one must ensure that the question is suitably defined such that it is not too wide, not too narrow, not too simple nor too complex. Open-ended questions are preferred, while questions that lend themselves to a Yes/No must be avoided. Good research questions are directional and lead to answers that require elaboration and discussion, and ideally, open to avenues for further research (Wisse & Roeland, 2022). In other words, good research question(s) must be consistent with and aligned with the research problem statement as well as what was stated as the research purpose (Lim, 2014).

### **Main challenging point**

The main challenge point in obtaining a doctoral degree starts specifically when students enter the stage of writing their dissertation document. This manifests itself in a large number of attritions in doctoral degrees and specifically at the start of the dissertation phase (Devos, et al., 2017). While a good number of students complete the earlier stages of their doctoral studies without many notable issues, the dissertation stage poses significant problems for a majority of them (Bloomberg & Volpe, 2018). Thus, an analysis of the factors that contribute to adding to the challenges of completing the writing of the dissertation is warranted. Our next section provides such analysis but limits the analysis to the cognitive level, or what we call here the “cognitive challenges”.

### ***COGNITIVE ANALYSIS***

This section provides an analysis of the cognitive factors that make aligning the key sections of doctoral dissertations a challenging task for many. According to the dictionary, the word cognitive means “skills and knowledge; involve the ability to acquire factual information, often the kind of knowledge that can easily be tested” (Merriam-Webster, n.d.). But to understand the factors that contribute to the challenges of aligning key sections, it will be helpful to discuss the issues that make writing doctoral dissertations a challenging task in general. So, we analyze the factors that make it harder for

students to complete the dissertation and earn their doctorate. In essence, we try to answer the following two questions in this section:

- What are the factors that make writing the doctoral dissertation a challenging task?
- What are the factors that make aligning the key sections a challenging task?

We realize that the answers to both questions may overlap, with some factors commonly shared in both questions. We will provide answers to these two questions separately: first to address the challenging factors for the dissertation in general and second to address the factors about the three key sections.

### **Challenges of the dissertation writing phase**

Choi (2019) conducted a study aimed at understanding the pedagogical challenges that face teaching students when they start writing their dissertations. Choi suggested that doctoral students go through two main stages when they complete their doctoral degree. The first stage is what we termed here the “pre-dissertation stage” and the second phase is the “Dissertation writing stage”. Choi’s study gave the stages more descriptive names, calling the first stage “consumer of knowledge,” while the second stage was called “producer of knowledge”.

A simple (and probably naïve) explanation of the difference between these two stages can be given by explaining the difference between the two words “consumer” and “producer”. Take, for example, a consumer and the producer of domestic produce. The consumer requirements are discerning the correct product to be purchased (availability, price, quality, etc.) and the knowledge necessary to use it for his/her purpose. For example, a consumer decides to purchase eggplant at the grocery store. The consumer needs to ensure that the plant is of good quality, it is on the grocery shelf, that it is offered at an acceptable price, and that s/he must know how to cook and prepare it such that the family can relish it at dinner. Simple and straightforward as these requirements sound, given that family budgets and economics are at stake (one must know the price of the product and decide if it is a good value for money) as well as family health is at stake, the task of the consumer is critical. The consumer should not purchase a bad product, overpay, or feed their family bad or unhealthy food. The point is, being a consumer comes with a lot of responsibility, and this task cannot be taken lightly.


However, for the consumer, no knowledge is required of what roles were played, when, and by whom, until that eggplant was placed on the grocery shelf, ready for purchase. On the other hand, the producer needs more information and the product must take many, many different steps that probably begin well before the eggplant seedling is planted at the farm – from planning the next season’s crop and acquiring quality seeds through proper tilling, soil preparation, and fertilizer to watering, cultivation, packaging, shipping, and transport, such that the product lands on the grocery shelf within a reasonable time, in good quality, and at an acceptable cost such that it can be appropriately priced for the consumer. Of course, more than one person is involved, but all of these steps are necessary and must align perfectly, for the consumer to be able to purchase a quality product at the right price and feed the family a healthy dinner.

In academic parlance, while at their pre-dissertation stage, the student is a consumer of knowledge – simply soaking up what is taught to them, responding to questions in tests, and expecting to be evaluated based on preassigned rubrics. There is no doubt that this endeavor is not to be taken lightly, and hours of hard work go into it. However, the process is more-or-less a prescribed one, and the typical student is familiar with it. When the student begins working on their dissertation phase, s/he must transition to becoming a producer of knowledge – a task that is, at minimum, not prescribed, and must be navigated more-or-less in isolation. The student must now begin thinking about how to identify a good research topic, identify then write a research problem, conduct a literature search, write up one or more properly formulated research questions, think through a research method, justify and successfully defend a need for research on that problem (the dissertation/research proposal),

and then begin collecting and analyzing data, writing out the complete doctoral dissertation, then finally presenting and defending their research findings.

The consumer and producer phases require vastly different thinking, and different dealings and naturally require some transformation of thinking and dealing. By transformation here, we mean transformation from the mentality of the consumer to the mentality of the producer. We call this transformation “cognitive transformation”. We distinguish this transformation as a stage that the students go through as they start writing their dissertations.

In Table 1, we present these stages in tabular format. In the first column we have the consumer of knowledge, while in the third column, we have the producer of knowledge. We used these terms as proposed by Choi (2019). The middle column is intended to explain the need for a distinct transformation stage that needs to be present, as the student transitions from the “Pre-Dissertation stage to the “Dissertation writing stage”. All three columns are left without completion so we can discuss, explain, and then present again later as we continue our writing of the challenges of writing doctoral dissertations.

Pre-Dissertation stage	Cognitive Transformation	Dissertation writing stage
Consumer of knowledge		Producer of knowledge

**Table 1: Stages of Doctoral Studies**

The type of knowledge being discussed here is called “Intellectual knowledge” (McWilliams, et al., 2005). It takes on other dimensions as well because this type of knowledge is commonly associated with “wisdom”. So, if we take into consideration everything noted here, a logical argument can be extended that students will be producing “wisdom” during their dissertation writing stage – something that is not easy and probably not experienced by students in their prior studies or experiences.

A deeper discussion of the terms “consumer of knowledge”, and “producer of knowledge” and the transformation phase between them is warranted here. Although, both the words “consumer” and “producer” deal with knowledge, they are distances apart in their meaning, in how they are dealt with, and in the transformation between them. So, more explanation about these three phases is given here to complete the cognitive analysis section.

**Consumers of knowledge**

Choi (2019) used the following words to characterize the “consumer of knowledge” or pre-dissertation stage:

- Teacher control
- Dependent stage
- Given assignments
- Adoption of knowledge
- Undertake guided research

Consumers of knowledge are learners who seek to acquire knowledge from other sources – such as from school, college, or university. Words with similar meanings to “consumer” that are used in academic parlance include student, learner, questioner, inquisitor, and inquirer. Thus, in academia, the

consumer of knowledge is also the seeker of knowledge – also called a student – and seeks knowledge within the framework of educational institutions such as colleges and universities.

The students depend largely on the teacher in their seeking of knowledge, thus it is termed “teacher control”. The student is dependent on the knowledge imparted within a controlled system of education by the teacher and follows certain rules and academic procedures, thus it is a dependent stage. The knowledge that is gained during the academic journey could be achieved through giving assignments and the student can learn to adopt the knowledge learned (Garand, 2022).

During the early stages of the writing of doctoral dissertations, the same rules listed above could apply. It is still teacher-controlled, and the student is still dependent on the teacher for learning that could be achieved through assignments to apply the knowledge (Boyce et al., 2019). Similarly, research assignments taken during the early days of doctoral studies are often guided and typically directed by the teacher (Golding et al., 2014). Thus, the terms “teacher control”, “dependent stage”, “given assignments”, “adoption of knowledge” and “guided research” applies to the students during the early undertaking of their doctoral studies.

### **Producers of knowledge**

McNabola and Coughlan (2014) suggested that the early days of the doctoral writing stage represent the beginning of the research stage for the student. Choi (2019) went further and used the following words (or phrases) to describe the characteristics of the doctoral writing stage:

- Independent stage
- Intellectual autonomy
- Assign themselves
- Self-directed
- Creating own knowledge

The point to emphasize here is that the words that describe this stage are notably different from what the students experienced during the pre-dissertation stage (Hwang, et al., 2015). Certain characteristics describe this stage, which makes them different from earlier academic stages. Examining these characteristics would help in understanding the challenges faced in writing the dissertation.

In the dissertation writing stage, students experience independence in the way they complete the requirements. For instance, they are not restricted by the topic selection – they choose their topic. They are expected to explore the topic and conduct independent research on it. They may consult with their advisors/mentors/supervisors, but the onus of the work is upon the student. Thus, the student is expected to begin independent thinking – which comes at a price, because it requires adjustment and often major adjustment (Hunter & Devine, 2016).

The same thing can be said about assigning themselves or being self-directed and creating their knowledge. This is unusually challenging at the cognitive level for the student to handle when working on the dissertation. To put all this in a nutshell, this stage of dissertation writing requires some major adjustments and some cognitive transformation on the part of the student (Garand, 2022).

### **The cognitive transformation**

By cognitive transformation, we mean what it takes mentally to adjust the thinking levels of the students when transforming from consumers of knowledge to producers of knowledge. In other words, we will explain it from the points of cognitive processing (Bouizegarene, 2020) or how the student absorbs the process that accompanies this transformation. Choi (2019) used the following words to describe this transformation by the student:

- Thinking beyond the norm
- Uncertainty
- Anxiety
- Depression

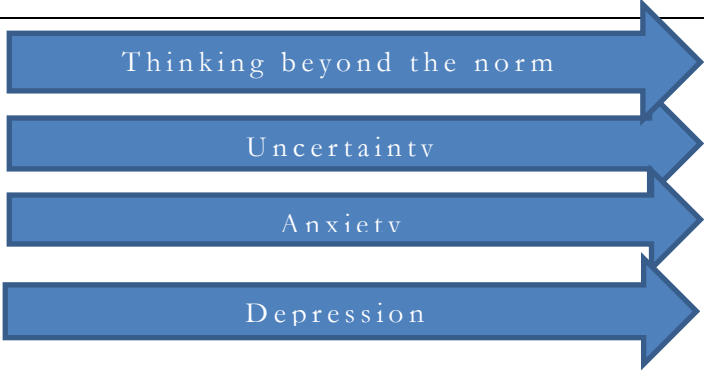


Students at various stages are known for experiencing sudden changes and they need to adjust as they finish one stage of their education and move on to another stage (Lovitts & Wert, 2009) They experience this transformation when they switch majors when they adjust to a new college or as they change from one major to another. So, another transformation should not be that much of a problem or as some may think. However, the transformation of the student from being a consumer of knowledge to a producer of knowledge is unlike most other academic experiences (Garand, 2022).

A successful transformation from being a consumer of knowledge to a producer of knowledge is not straightforward. It is accompanied by a lot of changes at the cognitive level, at the level of understanding of what needs to be done and how to do it. Naturally, this kind of transformation places a lot of pressure on the student. This pressure often manifests in different forms such as anxiety, stress, and depression (Ali & Sverdlik et al., 2018).

Choi (2019) used the term “Thinking Beyond the Norm” to explain the transformation stage from the pre-dissertation stage to the dissertation writing stage. New thinking is experienced by humans as they transition through different stages in their lives (Peden, et al., 2021). For doctoral students undergoing the consumer-to-producer transformation, the new thinking places cognitive challenges to which they must adjust (Goodman et al., 2020).

Table 2 depicts the stages that were presented in table 1 above, but now all three columns are populated. In the first column, we list the cognitive processes of the doctoral student before the dissertation stage, while the same processes after starting the dissertation stage are shown in the third column. The transformation takes time and takes some reorientation of the mental status, as students go through stress, depression, new ways of thinking, and going through sometimes prolonged periods of uncertainty (Ali et al., 2022).

Pre-Dissertation Phase	Cognitive Transformation	Dissertation writing phase
<ul style="list-style-type: none"> <li>• Dependent stage</li> <li>• Teacher control</li> <li>• Given assignments</li> <li>• Passive adoption of knowledge</li> <li>• Undertake guided research</li> </ul>	 <p style="text-align: center;">Thinking beyond the norm</p> <p style="text-align: center;">Uncertainty</p> <p style="text-align: center;">Anxiety</p> <p style="text-align: center;">Depression</p>	<ul style="list-style-type: none"> <li>• Independent stage</li> <li>• Intellectual autonomy</li> <li>• Assign themselves</li> <li>• Self-directed</li> <li>• Independent learning</li> <li>• Creating own knowledge</li> </ul>

**Table 2: The Transformation in the Dissertation Stage**

The dissertation stage is challenging to the students for the factors listed above and there could be other reasons as well. Within this transformation stage, students face these challenges in general, but writing certain sections of the dissertations is additionally challenging. This includes the formulation of the problem statement, the research purpose, and the research questions.

### ***WRITING THE RESEARCH PROBLEM STATEMENT IN DISSERTATIONS***

The section of the problem statement in doctoral dissertations is about defining a problem that will guide their doctoral research. Naturally, the problem statement needs to sound such that there is a problem, and that it is manageable within the timeline and the resources available. But aside from sounding like a research problem, other issues make writing this statement challenging.

A study conducted by Ali and Pandya (2021) brought multiple points that make writing the problem statement a challenging task. Among these, two points are relevant here. First, the problem statement should have a cause-and-effect relationship. And second, the defined problem statement must be connected to other relevant sections in the dissertation. The same study clarified this further and introduced some of the sections as presented in Figure 1 to show the interconnection of the problem statement with the other sections in the dissertation document.



**Figure1: The Interconnections Between Problem Statement and Other Sections in a Dissertation**

Jacobs (2013) emphasized that writing a problem statement represents a critical role in all remaining sections of the research. In terms of research in general, this kind of thinking requires new thinking skills and new creativity (Alajami, 2020). And these kinds of connections and conditions place extra challenges at the cognitive level for students who are still in the earlier stages of “thinking beyond the norms”.

### ***WRITING THE RESEARCH PURPOSE IN DISSERTATIONS***

Writing purpose statements is possibly not new to doctoral students. Students typically write about their purpose from the time they apply for some programs in high school and then for college, when filling out applications for studying in a particular program, taking a trip, applying for a scholarship, etc. During the early stages, the purpose statement forms the student's motto or brand, or roadmap. Often, this statement of purpose is about future direction or goal. The student starts with a sentence like “my purpose for applying to this program is to ...” - be a doctor, be a teacher, explore a new country, learn a new art form, and so on. The purpose is to talk to the students about themselves and take steps to achieve a personal or academic goal. There is little if any anticipated tangible outcome from these statements that need to be proven other than seeing themselves through to the end of that program.

Things are different at the dissertation writing stage. The purpose statement in the dissertation is about connecting to a problem, conducting a study, and doing something (or addressing) the problem. Certain conditions need to be met in the dissertation purpose statement. First, the research purpose statement has to be measurable. By measurable, it is meant an output that can be gauged and evaluated with certain criteria and against certain standards (Lim, 2014). Similar challenges are faced when developing a course, program, or another university objective. The purpose statement needs a verb and not any verb. The verb must be measurable and achievable within the time frame and resources that are available to the student (Lunenburg & Irby, 2008). One more point, this verb has to be consistent with the problem statement – in other words, this research purpose statement needs to clearly state how it addresses the problem that was previously defined. That is the alignment between the research problem and the research purpose. And achieving it is a challenging task (Newman & Covrig, 2013).

### ***WRITING THE RESEARCH QUESTION(S) IN DISSERTATIONS***

The topic of questions asked by students is discussed in different studies. Students often ask questions when they are confused about the topic explained or need clarification or differentiation. These questions are asked in what is termed a “Grammatically open” format. This means, other than perhaps some confusion and lack of clarity, there will be no problem with the question if it is not phrased in the correct grammar or the correct format. However, students often experience hesitancy when asking questions. The following represent some of the causes of this hesitancy (Reiser et al., 2017)

- Fear that the question may not make sense.
- Concern that the question reveals their lack of knowledge about the topic.
- Worry about how they are looked at by their colleagues in the classroom.
- The desire by the introverted student to simply not speak in public, even if they need help or clarification.

The point here is that asking questions sometimes comes at a price. And this leads to hesitancy in asking questions. The issue gets more complicated when students have to ask research questions in doctoral dissertations.

The well-written research question is expected to list what question(s) this research is supposed to address. Beyond every problem, there has to be a question (or questions) and this section is about listing the question(s) surrounding the problem statement. Doctoral students may have either just one research question for their dissertation or multiple research questions and/or sub-questions. For simplicity, from here on out, we will refer to this as a “question”, acknowledging that a student could have one question or multiple questions. The logic discussed below is applicable in either case.

The phrasing of a research question faces the following challenges (Lim, 2014)

- It must be phrased in question format.
- It needs to raise a question that is related to the already-defined problem statement.
- It has to be consistent with the research purpose that is previously written.
- It has to be consistent with the proposed research method.

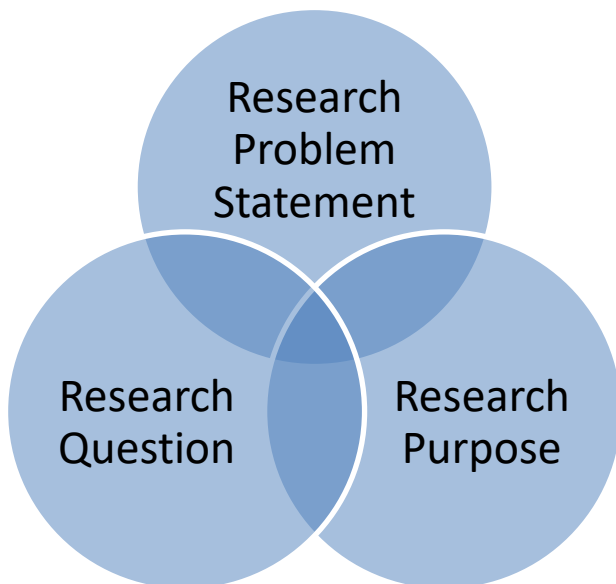
Such conditions are unlike other requirements of “Grammatically open” questions that students are familiar with in their past questioning. These new constraints along with the additional transformation stages that the doctoral students go through place a cognitive pressure that places a heavier burden, and which needs to be addressed in a pedagogical format (Lim et al., 2015).

### ***ALIGNING THE THREE SECTIONS***

Now we come to the discussion on providing cognitive analysis of the last phase, the alignment of the three sections. This requires the transformations that were discussed earlier, as well as the

alignment of the three sections. This adds additional cognitive challenges as the student works to write their dissertations and to the complexity of the problem (Miles, 2019).

A point to be emphasized here is that these three sections have some (probably a lot) in common in terms of how they are phrased. The problem statement lists the problem that began their dissertation. The research purpose deals with the same problem and the research question(s) posit question(s) about the problem. So, there are words or phrases that are common among these three key sections of the dissertation (Ocholla, 2022). We illustrate these commonalities in Figure 2:



**Figure 2: The Commonalities of the Key Sections in a Doctoral Dissertation**

This kind of overlap and commonalities in statements may sound to be helpful to many. However, they also may cause additional challenges to others because it raises the issue of consistency in research and how it challenges many (Golding, et al., 2014). These challenges and others need to be addressed in the teaching and the inclusion of pedagogical tools.

### ***PEDAGOGICAL TOOLS***

After listing and discussing the cognitive challenges, the question that could be asked is what can be done to address the challenges. Jarvin (2015) used the term “Pedagogical Tools” to describe tools available to educators to deal with the learning challenges of the students. Ergo, this section is about discussing tools that could help alleviate the challenges of writing and aligning the key sections of doctoral dissertations. In essence, this section is intended to answer the following question:

What pedagogical tools are available to address the challenges of aligning key sections of a doctoral dissertation?

Before we delve into pedagogical tools, we introduce cognitive games and the lessons we can learn from playing them. Then, we introduce a concept called “Analytical Thought Process” that is more applicable here and we continue to discuss Socratic Questioning and the educational tools that sprung from these concepts.

Lessons learned from cognitive games

Cognitive games are those that pose cognitive challenges to the player of the games. The players could be children as well as adults (Anguera & Gazzaley, 2015). Children’s games are increasingly popular. They help in different ways to overcome some common cognitive challenges. The same

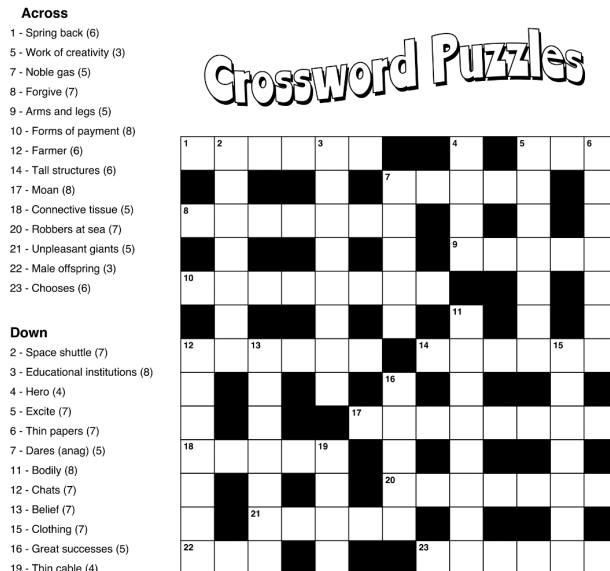
benefits can be sought when adults (or people in general) play games (Mayer, 2019; Wortley et al., 2017). By playing games we specify cognitive games, with the added benefit of playing these games being that “experiential learning” takes place, as the games can form a context for cognitive development (Akhutina & Romanova, 2017; Blumberg & Fisch, 2013).

Two examples can be given here: First, the game “spot the missing objects” and second, the game “crossword puzzles”. In the first game, children (or players) are presented with two images, side by side. The images could be filled with text or shapes. The two images are more or less the same, but one image is subtly different from the other, such as having fewer objects, missing objects, objects moved, replaced by other objects, or realigned. (Yukselturk et al., 2022). The task is to find the differences. Some games are more challenging than others, and the task itself could be more challenging to some than others. But the game serves a purpose: to focus on the differences. Figure 3 shows an example of this game, where the objective is to find seven differences between the two beach party scenes:



**Figure 3: The Game of Missing Objects (Lakritz, 2020)**

In the game of Crossword puzzles, the object is to fill in the missing squares. The difference this time is that the player is offered some clues and needs to connect the given pieces of information and produce the missing letter(s) based on the clues (Nugroho & Suprpto, 2017). The work is based on giving introductory information and producing narrow and identifiable objects. Figure 4 shows an example of this game:



**Figure 4: Example of the Game of Crossword Puzzles (Printablee, 2021)**

The objective of these two games – and all other similar games – is that they hook children (and adults) with their captivating nature (Wortley et al., 2017). It is engaging the player in playing and provides more tools and steps to continue playing. This whole process works like this:

- The intention is to narrow the focus on the subject being examined.
- Provide specific objectives from the exercise.
- Provide some starting points.
- Give clues as the work continues.
- Provide a narrow path to the conclusion.
- Give the player the chance to complete the game.

A similar approach is advocated by researchers in terms of giving clues, narrowing the focus, and then working to formally introduce concepts that are deemed helpful in completing many tasks, including the completion of a doctoral dissertation. This approach is called the “Analytical Thought Process”.

### Analytical thought process

Analytical Thought Process (ATP) is introduced in various fields of study and is credited with helping complete tasks. The basic explanation of ATP is “Thinking Analytically” or analyzing what is being discussed or being dealt with (Ali et al., 2022). A way to approach issues “or think analytically” when dealing with subjects is to break the task at hand into stages, to bring the focus on the issue at hand, and to tackle each of the stages separately. “Thinking Analytically” could also mean looking at the issue at hand from more than one perspective to better understand it.

Experts suggest that ATP could contribute to the successful completion of many tasks in different educational fields (Andrews, 2007; Nuroso et al., 2018). For instance, ATP helps with the completion of tasks in accounting/auditing (Plumlee et al., 2015), Mathematical Representations (Sukmaningthias & Hadi, 2016), and nursing education (Chan, 2013). While ATP was noted in general terms for contributing to completing tasks in these fields of study, Wilhelm and Kaunelis (2005) were more specific and suggested employing ATP in the writing of the literature review chapter of doctoral dissertations.

The use of ATP can come in handy and has proven to be helpful in many states in a doctoral dissertation. ATP could help in articulating the research problem statement which could lead to building a solid foundation for writing other sections in the dissertation document (Ali et al., 2022). While ATP is proven to be helpful in completing various tasks, at the core of ATP is to bring the focus to the issue at hand. The question that could be asked is how to bring the focus to the task at hand. In the case of the writing of doctoral dissertations, the questions could be about what tools doctoral educators can use to bring the focus to the task at hand. Different tools can be used by doctoral educators in this endeavor, the first of which is called “Socratic Questioning”.

### Socratic questioning

Socratic questioning is subservient to the general Socratic method, which is named after the Greek philosopher Socrates and has long since been thought of as the heart of ATP (Paul & Elder, 2008). It is also noted that understanding concepts embedded in ATP naturally generates questions. So, what can be gleaned from Paul and Elder is that ATP could be connected to thinking like a philosopher. While the phrase “thinking like a philosopher” may sound intimidating and may create some reluctance to pursue it, it is simpler than it sounds. We need to go back to learning more about Socratic questioning to explain how it could be used in helping write a doctoral dissertation.

The Socratic questioning is often followed by the “Socratic Dialogue” which is the essence of ATP. By starting with a question and following it up with questions, the intent is to continue the focus on the narrow subject selected for this dialogue. Socratic questioning helps narrow the focus of doctoral studies; thus, it can be used to help with the alignment of key sections of doctoral dissertations. This can be accomplished by asking questions that are specific to the topic being discussed, whether it will be a problem statement, research purpose, research question, or the alignment between any of them.

### Another tool - Bloom s Taxonomy

Bloom s Taxonomy or The Taxonomy of Educational Objectives is a framework that is widely used in academia to explain the intent or learning outcome of taking a course or completing a program of study (Arievitch, 2020). The purpose of this taxonomy is to phrase course objectives (or intended learning outcomes from taking the course) in a systematic way that makes it consistent when writing course or program objectives. Ramirez (2017) explained that a statement of a course objective in Bloom s taxonomy is constructed from four components: object, verb, keyword, and subject. For example, Table 3 shows the components used to construct the objective: “The student shall be able to describe the law of supply and demand equilibrium in economics”.

Object	Verb	Keyword	Subject
The student	shall be able to describe	the law of supply and demand equilibrium	in economics

**Table 3: Example of a Course Objective**

The study further suggested that most academic institutions omit the first column (the object) from the objective sentence listed in Table 3. In this study, we followed this suggestion and omitted “The Student” from listing the objectives of the program. Within the writing of dissertations, Bloom s Taxonomy could be very helpful in phrasing or stating the research purpose. It provides a list of verbs that can be used to start writing for research purposes. What is more helpful is that this taxonomy also lists the meaning of each verb and what it takes to provide measurement scales. This in essence can help doctoral students in writing their research objective (Purpose) because the taxonomy provides a list of verbs from which the students can select one or more to start writing their research purpose (Keshmiri et al., 2019).

### Ishikawa diagram (cause and effect model) as a tool

The Ishikawa diagram (also a Cause-and-Effect diagram or Fishbone diagram) is a technique that helps identify, analyze, and present possible causes of problems (Doskočil & Lacko, 2019). The technique uses a diagram that breaks down the problem into options, which in turn identify cause and effect and breaks down the diagram into categories of causes such as methods, materials, people, environment, and others. After the identification of these categories, assumptions, constraints, and limitations are identified, and they are put together as a diagram that depicts the cause and effect of the problem intended to be studied in the dissertation.

Figure 5 shows a generic Ishikawa diagram (Cause and Effect Model), indicating cause (environment, system, people, and processes) and effect (problem statement). In the context of a dissertation, the environment may be established by observation leading to induction. The system will provide a theory leading to deduction through a literature review. The people will represent the source of data. The data can be represented by words, pictures, icons, etc., and can be analyzed using thematic exploration. The processes will explain how a concept transforms into a construct leading to a variable. Ultimately, this variable will indicate the origin of the problem. Krathu et al. (2015) indicate that main cause categories - or rib branches - are identified first concerning the problem, followed by all possible causes, and finally, classification and sorting of these causes to establish affiliation between the causes and the main cause category. In Figure 5 the Options refer to observation leading to induction or environment. Here, the Cause can be replaced by either system, people, or processes. The Effect is the Origin of the Problem. In Figure 6 the main cause categories are Environment, System, People, and Processes. The fishbone diagram as a tool helps discover and categorize special effect causes and break down the core causes and discuss issues that arise.

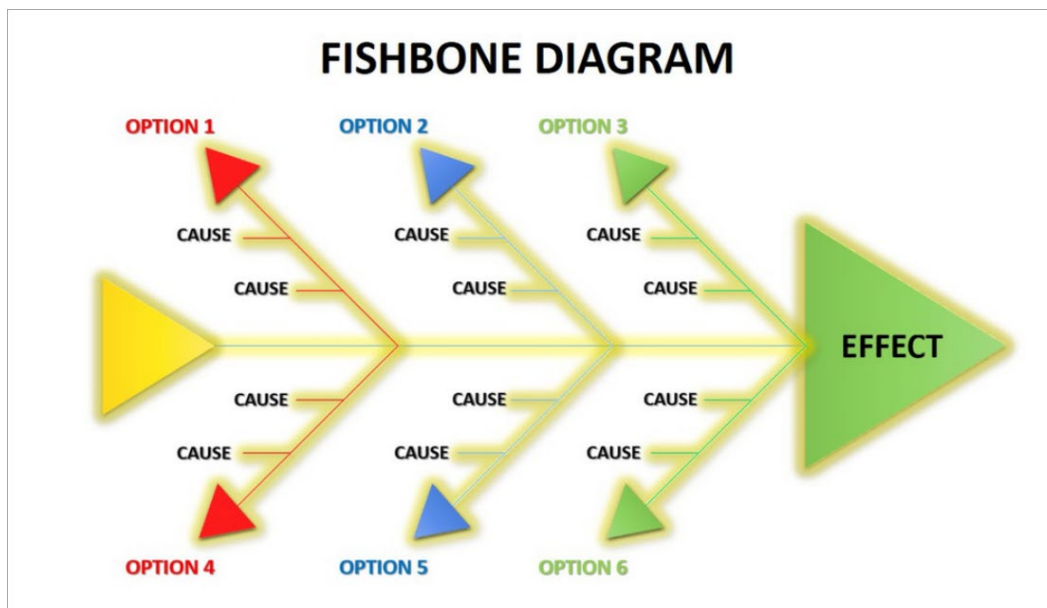


Figure 5: Isakawa Diagram - Cause and Effect Model (Kajal, 2022)

### Other instructional tools

The tools that are discussed so far in this section have a common feature in them: they all try to shift focus on the task at hand. While they are helpful, not every doctoral program would employ games or crossword puzzles. Instead, educational classrooms have provisions for similar deliverables while using different tools. Gaming cannot easily or consistently be incorporated into the classroom, especially at the doctoral dissertation stage. But there are variations of tools that educators use to achieve the same purpose as described in ATP and to shift the focus to the topic at hand and work through



the topic until completion. In particular, we discuss the following tools that help narrow the focus of the student to the issue(s) at hand:

- Fill-in-the-blank questions
- Side-by-side comparison
- Using mathematic expression
- The use of different colors and formats

In the fill in the blank question, the student is offered a partially completed sentence (or paragraph) and is asked to complete the sentence based on what is listed. The idea behind this is that it offers a starting point with limited focus. Although the options could increase as they start to fill in the blank, these options can be helped by suggesting keywords or hints to move the work forward (Gurney & Loewenstein, 2020).

In the side-by-side comparison, the student is offered two (or more) scenarios and is asked to compare. One helpful feature of this tool is that it focuses the attention on a specific area, typically one page, which simplifies the task of the comparison. This helps narrow the focus and direct it toward the completion of the topic (Liu et al., 2022).

Mathematical symbols in text writing are notorious for conveying lessons that typical text may not be able to (or less able to) convey when using text. Bernido (2022) introduced “Mathematical expression” and suggested they could be used to clarify typical English sentences or to emphasize points. For example, using the symbol “=” could be considered sometimes more convincing if the sentence reads “equal to” (Steinbring, 2015). This use of mathematical symbols can help in emphasizing certain points when we want to emphasize that the wording of the problem statement must be equal to the wording of the research purpose. In this case, instead of using the words “equal to”, using the  $\approx$  symbol may give a different emphasis on the importance of this equality between the two statements.

Similarly, different colors in a text or use of underlining or italics are used to convey a message that the text so identified is different, that its purpose is different, and that student needs to focus differently on it as compared to other sections of the text (Brom et al., 2018).

All of these are helpful tools that can help narrow the focus and shift attention to limited options thus using ATP to focus more which can be used in our introduction to the exercises.

## DISCUSSION AND FINDINGS

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Our literature review and the analysis we provided supported what we have known long before and that is: aligning the key sections of a doctoral dissertation document is a challenging task. This leads us as educators in doctoral programs to question what can be done to help address the challenges faced in such alignment. We intend to provide the answer to this question through the instrument that we present in this section. We use the lessons learned from our literature review to develop the instrument. In other words, we plan to use the lessons we learned about pedagogical tools to tackle the cognitive challenges explained about the aligning of key sections. The purpose of these steps is to develop our set of exercises in the instrument we present in this section.

The basic lesson to note here is that addressing the challenges explained in this study cannot be done in a single step. Instead, a concerted effort is needed to develop a series of steps that take the student through incremental stages of aligning the key sections of the doctoral dissertation document. In addition to this basic step, we stress the following points that are crucial to the development of our instrument:

- The use of the Analytical Thought Process (ATP) plays a pivotal role in focusing on the intended writing and alignment. ATP can be used by creating steps with distinct instructions and spaces that help in focusing on the task at hand.

- The focus of the students is kept through the use of Socratic questioning and Socratic dialogue. This is consistent with the lessons learned from cognitive tools. ATP provides room for starting the focus on the task and Socratic questioning and dialogue help maintain the focus.
- The use of other pedagogical tools is helpful as well and strengthens the effort for keeping the focus. Among these tools is the side-by-side comparison. Putting two statements side by side and asking the student to compare, contrast (and eventually align) helps with looking at inconsistencies and then correcting (and aligning) them.
- Other pedagogical tools that were discussed, include fill-the-blank, color coding, and using math symbols and the verbs in Bloom's Taxonomy will help phrase the statements correctly. They also help in noticing statement inconsistencies and eventually correcting and aligning them.

Based on the discussion above, we developed an instrument that takes doctoral students through a step-by-step approach in order to align key sections of their dissertation documents. Our instrument takes the student through six steps. In each step, we list instructions and distinct activities that the students are required to complete. Within each step, the use of the pedagogical tools that were discussed earlier is emphasized. So, for further clarification, we list the six steps that we formed in our instrument that intends to help with aligning key sections of doctoral dissertations.

### ***STEP 1: CLARIFYING THE PROBLEM STATEMENT***

Ali and Pandya (2021) introduced a model that divides the stages of developing the problem into four phases and suggests that the first step will be to correctly phrase the research problem and to emphasize the cause-and-effect relationship. That is, to specify that there is a cause of the problem being studied and that there is an effect from the same problem listed in the study. The cognitive challenge at this stage is the phrasing of the problem that challenges the students. The pedagogical tool we used for this step is the fill-in-the-blank tool and the Socratic question. Thus, our first exercise is directed toward overcoming this cognitive challenge about the cause-and-effect relationship. For problem statements that include more than one cause and effect, we suggested using the Fishbone diagram. We simplified the earlier figure of the Fishbone and drew a new figure with a different color to distinguish it for the students. Figure 6 shows the first set of exercises about defining the research problem statement:

Step #1: Please list below your research problem statement.

Step #1A: The problem statement should have cause and effect. So, list them both.

In the space below, list the cause in your research problem statement.

In the space below, list the effect of you research problem statement

Now, in the space below, write your research problem statement and tell us whether it has a cause/effect relationship – explain in the space below.

If you have more than one cause and effect, please refer to this diagram below and write down your cause-and-effect problem statement. You may break it down into categories that fit your study. These are suggested categories of environment, people, system and process.

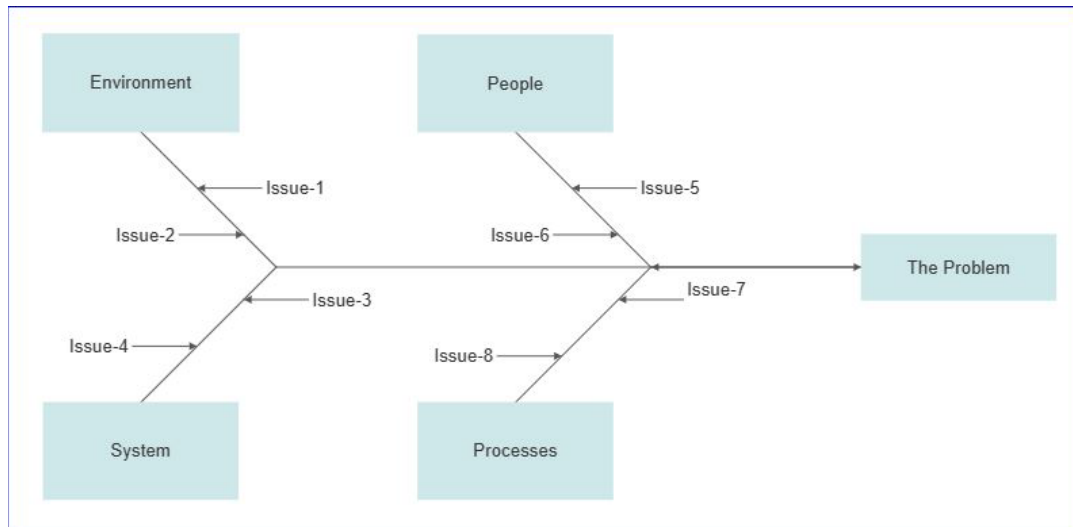


Figure 6: – Exercise for Clarifying the Research Problem Statement

**STEP 2: EXERCISE FOR WRITING THE RESEARCH PURPOSE**

This exercise is directed at defining the research purpose. As explained before, the research purpose should have a verb, a keyword, and a subject. The cognitive challenge faced at this stage is about selecting the proper verb that is consistent with the dissertation document content. We suggest using the fill-the-blank tool and starting with a sentence like “The purpose of this research is to \_\_\_\_\_” and then following through by listing one of the verbs from Bloom s taxonomy. We used Socratic questions, to follow the completion of the sentence to keep the focus on the task at hand which is the writing of research purpose. We are aware that the students may have more than one purpose for their research, but there has to be an overarching purpose for the study,

and this is what we are after in this step. We are cognizant that the student is free to add secondary purpose(s) later but our main goal from this step is to help phrase the research purpose properly.

Step #2

As you know, the purpose statement should have a verb (from Bloom s Taxonomy), a keyword, and a subject. Please list below each one of these components

What is the verb you used:

What is the keyword used:

What is the subject you used?

Now start with a sentence such as “The purpose of this research is to \_\_\_\_\_” and continue phrasing the sentence. Please complete this sentence and include the verb, the subject and the keyword in the sentence

The purpose of my research is: \_\_\_\_\_

**Question #1: Does your research purpose have a direct reference to the problem in the sentence? Why? And, how?**

Figure 7: Exercise for Defining the Problem Statement

### ***STEP 3: ALIGNING THE PROBLEM STATEMENT WITH THE RESEARCH PURPOSE***

When attempting to align two sections (research problem statement and research purpose), the issue goes beyond phrasing each section separately. The issue becomes more entangled because the two statements have to be compared to each other. For comparing two statements, we propose that it is best if they are aligned next to each other to make the comparison between the two easier. Figure 8 shows the exercise we use for a side-by-side comparison. Although technically, this is not exactly side by side, we place them one above the other. The point is to put them close to each other so they can be compared and to find differences between the two. Making the student repeat the writing of the problem statement without looking at what they have written before helps with keeping their focus on the issue at hand. Then after writing the two statements comes the time for comparison between the two.

Step #3: Make adjustments as appropriate to sections of Steps 1 and 2, then list them in the table below:

Research Problem Statement	
Research Question	

Question #3A: Review both statements above and tell us if these statement match (Explain how and why)

Question #2: Make necessary adjustments to make them match. If they do not match, you will not be able to go forward without matching these sections. After making the necessary adjustment to make the match, list both statements below when they match.

**Figure 8: Exercise for Aligning the Problem Statement with the Research Question**

***STEP 4: DEFINING THE RESEARCH QUESTION:***

In this exercise, we ask the students to list the research question and try to align it with the research purpose. The challenge here is to first list the research question in the right format (such as does the sentence end with a question mark?). Then it should be aligned with the research problem statement. The pedagogical tool we used here is the filling-in-the-blank tool. We also consistently and throughout our steps, used Socratic questioning to enforce, stress the point, and also to keep the focus on the subject being discussed. Figure 9 shows this exercise.

**Step #4:** Now list your research question. In case you have more than one research question in your study, choose the overarching research question that characterizes your study.

Is your research question presented in the correct format? Explain

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**Question #3:** Does your research purpose match what you stated in the research problem statement and your research question? Y/N

How? And why?

Figure 9: Exercise to Define the Research Question

### ***STEP 5: ALIGNING PROBLEM STATEMENTS WITH RESEARCH QUESTIONS***

This step is about aligning the problem statement with the research question. We first ask the students to list the problem statement to remind the student of what they have defined. We then ask the student to list the research questions, this again a reminder of what they have listed. Putting them adjacent to each other encourages contrast and promotes comparison. Figure 10 below shows the exercise to align the problem statement with the research questions. The cognitive challenge sprung from phrasing the two statements together. We use different pedagogical tools to complete this step, amongst:

- Side-by-side comparison to focus on the differences as we learned from the lessons from the cognitive games.
- Fill in the blank have to start using ATP and focus on the task.
- Socratic questioning and Socratic dialogue to keep the focus on the task at hand.

Step #5A: In the space below, list your research problem statement again

Please list below your research Question(s)

**Question #1:** Do the two statements above (problem statement and question) match? Y/N, explain below

Step #5B: Make adjustments to both sections above and list them in the table below:

Research Problem Statement	
Research Question	

Please review both problem statement and research question above, please answer the question:

Do these two statements match Y/N?

Why and how?

**Figure 10: Exercise to Align Research Problem with Research Questions**

***STEP 6: ALIGNING ALL THREE SECTIONS***

This step is intended to help align all three sections together. The cognitive challenge that is faced here is to align all three sections together. Using a cognitive tool like side-by-side comparison and the use of Mathematic symbols in communication should help with noticing discrepancies. We used the mathematical symbol of the equal sign with almost equal, i.e. “ $\approx$ ” meaning identical to, which is distinct from the “=” equal to symbol. This conveys the message of the importance of making the three sections equal even though they may not be the same. We also used Socratic questioning and Socratic dialogue from the pedagogical tools to help keep the focus on this discussion.

**Step #6:** Please include your revised problem statement, research question and your research purpose in the table below.

Research Problem statement		Research Question		Research Purpose
	≈		≈	

**Question #4:** Question #5: After looking at these three sections as explained in the mathematical symbol includes, do these statements match?

Explain how and why

**Figure 11: Exercise for Ensuring Alignment of Three Sections**

## EXTENDING THE EXERCISES

Up to this point, it sounds like we have achieved our objective and we should start writing the summary and complete this paper. Not so fast, as we worked on the issue here, we also realized that other sections of the dissertation need to be aligned and their alignment is as critical to the success of the dissertation. These sections are namely the theoretical framework and data collection questions.

For the exercises to be applied and for us to contribute to addressing these issues for other sections of the dissertations, we offer another in the appendix combined exercises that address these issues. The appendix presents a full set of exercises that deal with most of the sections of doctoral dissertations that need to be aligned. The strategy is the same, offering space to fill in the blank for various sections to be filled, and offering side-by-side comparisons. We do not feel an additional explanation for this appendix is necessary because it represents a repetition of what we already have discussed about the key sections of the dissertation and the pedagogical tools we discussed in this paper.

## SUMMARY AND SUGGESTIONS FOR FUTURE RESEARCH

This paper was about dealing with a task that is challenging for many doctoral students. It was about the alignment of the key sections of chapter one of a doctoral dissertation. This paper started by giving background to the topic, it then introduced a section to provide cognitive analysis of the underlying factors that cause these challenges. That was followed by identifying the pedagogical tools



that are helpful to the task of aligning the key sections of chapter one. Next, exercises that are intended to help address these challenging tasks were introduced. We have used these exercises in our dissertation courses. From our experience, these exercises help the students with alignment, and thus we shared them in this paper. We recommend using these exercises or something similar to help with alignment. We also recommend using these exercises at various stages of the dissertation completion process because, as the student continues to write their dissertation, their written work is bound to meander, but all the sections must be aligned at the end. Thus, we suggest one use these exercises (or similar steps) at the beginning of the dissertation, then periodically throughout, until the thesis is complete and ready for defense.

We believe the exercises we introduced here are helpful to students who address a major challenge in writing the dissertation. Yet, despite the value that our paper has added, we feel that our exercises and all the analysis would be more persuasive if we included examples for each section. We can use examples from our students and the progression they made to reach their final dissertation stage. However, such combined analysis and student examples will be lengthy and will be beyond the scope of a journal or conference paper. In our opinion, this will take the scope of writing a book. Thus, as a continuation of the progression of our paper, we are planning to write a book about completing dissertations. We intend to publish a textbook that helps mentors guide doctoral students to complete their dissertations.

## REFERENCES

- Akhutina, T., & Romanova, A. (2017). Games as a tool for facilitating cognitive development. In T. Bruce, P. Hakkarainen, & M. Bredikyte (Eds.), *The Routledge International Handbook of Early Childhood Play* (pp. 357-375). Routledge. <https://doi.org/10.4324/9781315735290-34>
- Alajami, A. (2020). Beyond originality in scientific research: Considering relations among originality, novelty, and ecological thinking. *Thinking Skills and Creativity*, 38, 100723. <https://doi.org/10.1016/j.tsc.2020.100723>
- Ali, A., & Pandya, S. (2021). A four stage framework for the development of a research problem statement in doctoral dissertations. *International Journal of Doctoral Studies*, 16, 469-485. <https://doi.org/10.28945/4839>
- Ali, A., Pandya, S., & Varma, U. C. (2022). Using analytical thought process to develop instructional rubrics in writing doctoral dissertation research problem statement - A follow-up study. *International Journal of Doctoral Studies*, 17, 385-399. <https://doi.org/10.28945/5017>
- Andrews, R. (2007). Argumentation, critical thinking and the postgraduate dissertation. *Educational Review*, 59(1), 1-18. <https://doi.org/10.1080/00131910600796777>
- Anguera, J. A., & Gazzaley, A. (2015). Video games, cognitive exercises, and the enhancement of cognitive abilities. *Current Opinion in Behavioral Sciences*, 4, 160-165. <https://doi.org/10.1016/j.cobeha.2015.06.002>
- Arievitch, I. M. (2020). Reprint of: The vision of developmental teaching and learning and Bloom's taxonomy of educational objectives. *Learning, culture and social interaction*, 27, 100473. <https://doi.org/10.1016/j.lcsi.2020.100473>
- Bernido, R. (2022, May 17). Mathematical language and symbols. *Owlcation*. <https://owlcation.com/stem/Mathematical-Language-and-Symbols>
- Bloomberg, L. D., & Volpe, M. (2018). Achieving alignment throughout your dissertation. In L. D. Bloomberg & M. Volpe, *Completing your qualitative dissertation: A road map from beginning to end*. SAGE Publications.
- Blumberg, F. C., & Fisch, S. M. (2013). Introduction: Digital games as a context for cognitive development, learning, and developmental research. *New Directions for Child and Adolescent Development*, Spring (139), 1-9. <https://doi.org/10.1002/cad.20026>
- Bouizegarene, N. (2020). Have we lost the thinker in other minds? Human thinking beyond social norms. *The Behavioral and Brain Sciences*, 43, e94. <https://doi.org/10.1017/S0140525X19002875>

## Aligning Key Sections of Doctoral Dissertations

- Boyce, B. A., Hollibaugh, C., Lund, J. L., Napper-Owen, G., & Almarode, D. (2019). Doctoral students perspectives on their doctoral dissertations. *Quest*, 71(3), 311-320. <https://doi.org/10.1080/00336297.2019.1618073>
- Breitenbach, E. (2019). Evaluating a model to increase doctorate program completion rates: A focus on social connectedness and structure. *International Journal of Doctoral Studies*, 14, 217-236. <https://doi.org/10.28945/4239>
- Brom, C., Stárková, T., & D'Mello, S. K. (2018). How effective is emotional design? A meta-analysis on facial anthropomorphisms and pleasant colors during multimedia learning. *Educational Research Review*, 25, 100-119. <https://doi.org/10.1016/j.edurev.2018.09.004>
- Bunton, D. (2005). The structure of PhD conclusion chapters. *Journal of English for Academic Purposes*, 4(3), 207-224. <https://doi.org/10.1016/j.jeap.2005.03.004>
- Chan, Z. C. (2013). A systematic review of critical thinking in nursing education. *Nurse Education Today*, 33(3), 236-240. <https://doi.org/10.1016/j.nedt.2013.01.007>
- Choi, J. A. (2019). Am I supposed to create knowledge?: Pedagogical challenges of doctoral mentors. *Educational Process: International Journal*, 8(2), 145-152. <https://doi.org/10.22521/edupij.2019.82.5>
- Devos, C., Boudrenghien, G., Van der Linden, N., Azzi, A., Frenay, M., Galand, B., & Klein, O. (2017). Doctoral students' experiences leading to completion or attrition: A matter of sense, progress and distress. *European Journal of Psychology of Education*, 32(1), 61-77. <https://doi.org/10.1007/s10212-016-0290-0>
- Doskočil, R., & Lacko, B. (2019). Root cause analysis in post project phases as application of knowledge management. *Sustainability*, 11(6), 1667. <https://doi.org/10.3390/su11061667>
- Ellis, T. J., & Levy, Y. (2012). Data sources for scholarly research: Towards a guide for novice researchers. In *Proceedings of InSITE 2012: Informing Science+ IT Education Conference* (pp. 405-416). <https://doi.org/10.28945/1663>
- Faryadi, Q. (2018). PhD thesis writing process: A systematic approach--How to write your introduction. *Creative Education*, 9, 2534-2545. <https://doi.org/10.4236/ce.2018.915192>
- Garand, J. C. (2022). Transitioning from consumers of knowledge to producers of knowledge: Teaching scope and methods to doctoral students. In M. Brown, S. Nordyke, & C. Thies (Eds.), *Teaching graduate political methodology* (pp. 8-16). Edward Elgar Publishing. <https://doi.org/10.4337/9781800885288.00010>
- Golding, C., Sharmini, S., & Lazarovitch, A. (2014). What examiners do: What thesis students should know. *Assessment & Evaluation in Higher Education*, 39(5), 563-576. <https://doi.org/10.1080/02602938.2013.859230>
- Goodman, P., Robert, R. C., & Johnson, J. E. (2020, November). Rigor in PhD dissertation research. In *Nursing forum*, 55(4), 611-620). <https://doi.org/10.1111/nuf.12477>
- Grant, C., & Osanloo, A. (2016). Understanding, selecting, and integrating a theoretical framework in dissertation research: Creating the blueprint for your "house". *Administrative Issues Journal: Connecting Education, Practice, and Research*, 4(2), 7. <https://doi.org/10.5929/2014.4.2.9>
- Gurney, N., & Loewenstein, G. (2020). Filling in the blanks: What restaurant patrons assume about missing sanitation inspection grades. *Journal of Public Policy & Marketing*, 39(3), 266-283. <https://doi.org/10.1177/0743915619875419>
- Hunter, K. H., & Devine, K. (2016). Doctoral students' emotional exhaustion and intentions to leave academia. *International Journal of Doctoral Studies*, 11, 35-61. <https://doi.org/10.28945/3396>
- Hwang, E., Smith, R. N., Byers, V. T., Dickerson, S., McAlister-Shields, L., Onwuegbuzie, A. J., & Bengé, C. (2015). Doctoral students' perceived barriers that slow the progress toward completing a doctoral dissertation: A mixed analysis. *Journal of Educational Issues*, 1(1), 165-190. <https://doi.org/10.5296/jei.v1i1.7703>
- Jacobs, R. L. (2013). Developing a dissertation research problem: A guide for doctoral students in human resource development and adult education. *New Horizons in Adult Education and Human Resource Development*, 25(3), 103-117. <https://doi.org/10.1002/nha3.20034>

- Jarvin, L. (2015). Edutainment, games, and the future of education in a digital world. *New Directions for Child and Adolescent Development, Spring*(147), 33-40. <https://doi.org/10.1002/cad.20082>
- Kajal. (2022, March 16). *Fishbone diagram - How to use it for root cause analysis*. Unichrone Blog. <https://unichrone.com/blog/quality-management/fishbone-root-cause-analysis/>
- Keshmiri, F., Gandomkar, R., Hejri, S. M., Mohammadi, E., & Mirzazadeh, A. (2019). Developing a competency framework for health professions education at doctoral level: The first step toward a competency based education. *Medical Teacher, 41*(11), 1298-1306. <https://doi.org/10.1080/0142159X.2019.1636952>
- Krathu, W., Pichler, C., Xiao, G., Werthner, H., Neidhardt, J., Zapletal, M., & Huemer, C. (2015). Inter-organizational success factors: A cause and effect model. *Information Systems and e-Business Management, 13*, 553-593. <https://doi.org/10.1007/s10257-014-0258-z>
- Lakritz, T. (2020, June 24). An artist sneaks hard-to-spot details into his brain-teasing illustrations. See if you can find the 7 differences between these beach party scenes. *Insider*. <https://www.insider.com/spot-the-difference-beach-pictures-brainteaser-2020-6>.
- Lim, J. M. H. (2014). Formulating research questions in experimental doctoral dissertations on applied linguistics. *English for Specific Purposes, 35*, 66-88. <https://doi.org/10.1016/j.esp.2014.02.003>
- Lim, J. M. H., Loi, C. K., Hashim, A., & Liu, M. S. M. (2015). Purpose statements in experimental doctoral dissertations submitted to US universities: An inquiry into doctoral students' communicative resources in language education. *Journal of English for Academic Purposes, 20*, 69-89. <https://doi.org/10.1016/j.jeap.2015.06.002>
- Liu, X., Liu, K., & Huang, H. (2022). Collective behavior and hydrodynamic advantage of side-by-side self-propelled flapping foils. *Physical Review E, 105*(6), 065105. <https://doi.org/10.1103/PhysRevE.105.065105>
- Lovitts, B. E., & Wert, E. L. (2009). *Developing quality dissertations in the humanities: A graduate student's guide to achieving excellence*. Stylus Publishing
- Lunenburg, F. C., & Irby, B. J. (2008). *Writing a successful thesis or dissertation: Tips and strategies for students in the social and behavioral sciences*. Corwin Press. <https://doi.org/10.4135/9781483329659>
- Mayer, R. E. (2019). Computer games in education. *Annual Review of Psychology, 70*, 531-549. <https://doi.org/10.1146/annurev-psych-010418-102744>
- McNabola, A., & Coughlan, P. (2014, September). Exploiting the thesis research: Educating engineering PhD students to think and to act entrepreneurially. In *2014 SEFI Annual Conference, Birmingham*.
- McWilliams, A., Siegel, D., & Van Fleet, D. D. (2005). Scholarly journals as producers of knowledge: Theory and empirical evidence based on data envelopment analysis. *Organizational Research Methods, 8*(2), 185-201. <https://doi.org/10.1177/1094428105275377>
- Merriam-Webster. (n.d.). Cognitive. In *Merriam-Webster.com dictionary*. <https://www.merriam-webster.com/dictionary/cognitive>
- Miles, D. A. (2017, August). A taxonomy of research gaps: Identifying and defining the seven research gaps. In *Doctoral student workshop: finding research gaps-research methods and strategies, Dallas, Texas* (pp. 1-15).
- Miles, D. A. (2019, June). *Research Methods and Strategies. Achieving alignment: How to achieve research alignment in a study*. Research Gate. <https://www.researchgate.net/publication/333772680>
- Newman, I., & Covrig, D. M. (2013). Building consistency between title, problem statement, purpose, & research questions to improve the quality of research plans and reports. *New Horizons in Adult Education and Human Resource Development, 25*(1), 70-79. <https://doi.org/10.1002/nha.20009>
- Nugroho, W., & Suprpto (2017, December). The effectiveness of picture crossword puzzle game in teaching vocabulary. In *ELT Forum: Journal of English Language Teaching, 6*(2), 191-200. <https://journal.unnes.ac.id/sju/index.php/elt/article/view/20701/9825>

## Aligning Key Sections of Doctoral Dissertations

- Nuroso, H., Siswanto, J., & Huda, C. (2018). Developing a learning model to promote the skills of analytical thinking. *Journal of Education and Learning (EduLearn)*, 12(4), 775-780 <https://doi.org/10.11591/edu-learn.v12i4.5814>
- Ocholla, D. N. (2022). A research dashboard for aligning research components in research proposals, Theses, and dissertations in library and information science. In P. Ngulube (Ed.), *Handbook of Research on Mixed Methods Research in Information Science* (pp. 629-640). IGI Global.
- Okoli, C. (2015). A guide to conducting a standalone systematic literature review. *Communications of the Association for Information Systems*, 37(1), 43. <https://doi.org/10.17705/1CAIS.03743>
- Paul, R., & Elder, L. (2008). Critical thinking: The art of Socratic questioning, part III. *Journal of Developmental Education*, 31(3), 34-35.
- Peden, M., Eady, M., Okely, A., & Jones, R. (2021). Thinking beyond the norm: Using alternate theories in early childhood education and care physical activity interventions. *Journal of Research in Childhood Education*, 35(4), 642-650. <https://doi.org/10.1080/02568543.2020.1810835>
- Plumlee, R. D., Rixom, B. A., & Rosman, A. J. (2015). Training auditors to perform analytical procedures using metacognitive skills. *The Accounting Review*, 90(1), 351-369.
- Printablee. (2021, February 24). Large print easy crossword puzzles printable. [https://www.printablee.com/post\\_large-print-easy-crossword-puzzles-printable\\_263418/](https://www.printablee.com/post_large-print-easy-crossword-puzzles-printable_263418/)
- Ramirez, T. V. (2017). On pedagogy of personality assessment: Application of Bloom's taxonomy of educational objectives. *Journal of Personality Assessment*, 99(2), 146-152. <https://doi.org/10.1080/00223891.2016.1167059>
- Reiser, B. J., Novak, M., Tipton, K., & Adams, L. (2017). Asking questions. In C. V. Schwarz, C. Passmore, & B. J. Reiser (Eds.), *Helping students make sense of the world using next generation science and engineering practices* (pp. 87-108). National Science Teachers Associations Press.
- Russell-Pinson, L., & Harris, M. L. (2019). Anguish and anxiety, stress and strain: Attending to writers' stress in the dissertation process. *Journal of Second Language Writing*, 43, 63-71. <https://doi.org/10.1016/j.jslw.2017.11.005>
- Skakni, I. (2018). Doctoral studies as an initiatory trial: Expected and taken-for-granted practices that impede PhD students' progress. *Teaching in Higher Education*, 23(8), 927-944. <https://doi.org/10.1080/13562517.2018.1449742>
- Steinbring, H. (2015). Mathematical interaction shaped by communication, epistemological constraints and enactivism. *ZDM*, 47(2), 281-293. <https://doi.org/10.1007/s11858-014-0629-4>
- Sukmaningthias, N., & Hadi, A. R. (2016). Improve analytical thinking skill and mathematical representation of the students through math problem solving. In *Proceeding of 3rd international conference on research, implementation and education of mathematics and science* (pp. 449-454).
- Sverdlik, A., Hall, N. C., McAlpine, L., & Hubbard, K. (2018). The PhD experience: A review of the factors influencing doctoral students' completion, achievement, and well-being. *International Journal of Doctoral Studies*, 13, 361-388. <https://doi.org/10.28945/4113>
- Wilhelm, W. J., & Kaunelis, D. (2005). Literature reviews: Analysis, planning, and query techniques. *Delta Pi Epsilon Journal*, 47(2).
- Wisse, M., & Roeland, J. (2022). Building blocks for developing a research question: The ABC-model. *Teaching Theology & Religion*, 25(1), 22-34. <https://doi.org/10.1111/teth.12603>
- Wortley, D., An, J.-Y., & Heshmati, A. (2017). Tackling the challenge of the aging society: Detecting and preventing cognitive and physical decline through games and consumer technologies. *Healthcare Informatics Research*, 23(2), 87. <https://doi.org/10.4258/hir.2017.23.2.87>
- Yukselturk, E., Ilhan, F., & Altioek, S. (2022). Preservice teachers' views about the use of mind and intelligence games in education. *Participatory Educational Research*, 9(6), 398-417. <https://doi.org/10.17275/per.22.145.9.6>

## APPENDIX – EXERCISES TO ALIGN SECTIONS OF DOCTORAL DISSERTATIONS

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In this section, we present exercises that we use in our dissertation courses to align different sections of doctoral dissertations. This is not limited to the key sections of Chapter 1. Instead, it covers a wider range of sections in the doctoral dissertation that need to be aligned. In our opinion, the sections covered in this appendix are the major sections that need to be aligned. However, different studies could focus on aligning other sections. We think a similar approach can be followed to develop exercises for aligning other sections. We used these exercises in our courses. They were largely helpful, and we present them here so other faculty may use them for their dissertation courses. We start the exercises on a new page, below.

Course in Advanced Research Method

Student Name: \_\_\_\_\_

Exercise to match sections of Chapter 1

In this document, I will take you through some nine steps to align four sections of your chapter 1: research problem statement, research purpose, research questions, and theoretical foundations. You will have to answer the five questions listed below. My instructions and questions are listed in blue fonts to distinguish them from your answers to the questions. All your answers should be in black fonts. Follow the steps below and answer the questions. After you complete this exercise, please send me the document through the course messages. So let us go:

**Step #1:** Please list below your research problem statement

Step #1A: The problem statement should have cause and effect, so we want you to list both of them next.

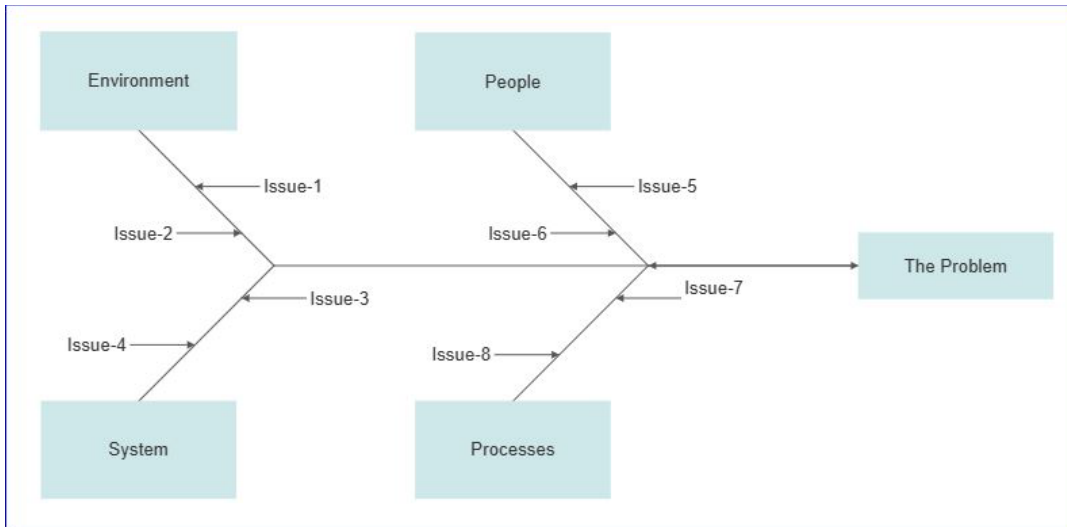
In the space below, list the cause in your research problem statement

In the space below, list the effect of your research problem statement

Now, in the space below, write your research problem statement and tell us whether it has a cause/effect relationship – explain in the space below

---

If you have more than one cause and effect, please refer to this diagram below and write down your cause-and-effect problem statement. You may break it down into categories that fit your study. These are suggested categories of environment, people, system, and process.



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## Step #2

As you know, the purpose statement should have a verb (from Bloom's Taxonomy), a keyword, and a subject. Please list below each one of these components

What is the verb you used is:

What is the keyword is:

What is the subject you used?

Now start with a sentence such as "The purpose of this research is to \_\_\_\_\_" and continue phrasing the sentence. Please complete this sentence and include the verb, the subject, and the keyword in the sentence

The purpose of my research is: \_\_\_\_\_

**Question #1:** Does your research purpose have a direct reference to the problem in the sentence? Why? And, how?

**Question #2:** Now after you compare them in the table, do they match?. Make necessary adjustments to make them match. If they do not match, you will not be able to go forward, because you will face more challenges from the IRB and committee reviews.

**Step #3:** Make adjustments to both sections above and list them in the table below:

Research Problem Statement	
Research Question	

**Question #3A:** Review both statements above and tell us if these statement match (Explain how and why)

**Question #2:** Make necessary adjustments to make them match. If they do not match, you will not be able to go forward without matching these sections. After making the necessary adjustment to make the match, list both statements below when they match

**Step #4:** Now list your research question. In case you have more than one research question in your study, choose the overarching research question that characterizes your study.

Does your research question come in question format? Explain

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**Question #3:** Does your research purpose match what you stated in the research problem statement and your research question? Y/N

How? And why?

---

**Step #5A:** In the space below, list your research problem statement again

Please list below your research Question(s)

**Question #1:** Do the two statements above (problem statement and question) match? Y/N, explain below

**Step #5B:** Make adjustments to both sections above and list them in the table below:

Research Problem Statement	
Research Question	

Please review both the problem statement and research question above, please answer the question:

After you look at these statements side by side, do these two statements match Y/N?

Why and how?

**Step #6:** Please include your revised problem statement, research question, and your research purpose in the table below.

Research Problem statement		Research Question		Research Purpose
	≈		≈	

Question #5: After looking at these three sections as explained in the mathematical symbol includes, do these statements match? Explain

---



**Step #7:** The table below is the same table with the three columns listed above. You need to copy the information from the table above and paste it into the table below. For the third row of this table below, please explain how your theoretical foundation helps with each of the columns: research problem statement, research question, and research purpose.

Research Problem statement	Research Question	Research Purpose

**Step #8A:**

In the space below, list the research question again

**Step #8B**

In the space below, list the most important three questions that you will ask in your data collection (do not list demographic questions, list the questions that you are going to use in your surveys, interview, or whatever method you are going to use for data collection

- Your Question #1:
- Your Question #2:
- Your Question #3:

---

**Step #9**

The table below contains two columns. In the first column, copy the three questions you have in step #8B. In the second column, explain how this survey (or interview question) helps answer your research questions listed in step 8A.

Your Survey/interview question	Explain how your survey/interview question answers your research question

---

**Step #10A:**

In the space below, please list your theoretical foundation:

**Step 10B:**

In the space below, list your research purpose (from Chapter 1)

**Step #10C:**

In the space below, how does your theoretical foundation (Listed in step 10a) achieve your research purpose (achieved in step 10B)

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**Step #11:** After you complete all the ten steps above, and answered all ten questions above, please email me the document back through the course messages.

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