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## **ABSTRACT**

Novice researchers lack an understanding of philosophical assumptions, paradigms, and praxis (3Ps) and their relationships with each other in research. As a result, the lack of understanding and application of the 3Ps components by novice researchers undermines confidence in the rigor and trustworthiness of their research. This study focused on filling this gap by providing a learning tool (Advance Organizer – AO) that contributes to developing knowledge of 3Ps in novice researchers. To achieve this, a two phased study was conducted. The first phase used a Delphi technique to collect data of the design of the AO in three rounds with instructional design experts, while the second phase, used semi-structured interviews with novice researchers to conduct a user test of the AO.

Phase 1 produced evidence from instructional design experts that the principles of multimedia learning (i.e., coherence, signaling, spatial contiguity, segmenting, pre-training, modality, multimedia, personalization) have been used to a great extent in 3Ps AO. This reduced the external cognitive load, the management of the intrinsic cognitive load, and an increase in the germane cognitive load. Instructional design experts have also voiced their opinion of the 3Ps AO as a helpful learning tool for novice researchers.

The results of phase 2 revealed that novice researchers, with either lower or higher experiences in research, faced challenges in understanding the 3Ps of the research. They described these components interchangeably and in unstructured ways, sometimes incorrectly. After reviewing the 3Ps learning tool, novices showed positive impressions and results during final conversations about the 3Ps. In short, instructional design experts and novice researchers alike expressed that the 3Ps AO is a helpful learning.



VALIDATION AND PERCEPTIONS OF AN ADVANCE ORGANIZER ON MAIN  
ELEMENTS OF RESEARCH: PHILOSOPHICAL ASSUMPTIONS, PARADIGMS, AND  
PRAXIS

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Dissertation

Submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy  
(Ph.D.) in Instructional Design, Development and Evaluation.

Syracuse University

July 2021

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## ACKNOWLEDGMENTS

I must first thank God Almighty, who blessed me in completing this work and makes all things possible. Then I want to thank my parents, Rashed Alogaily and Norah Altamimi. Your emphasis on education and your sacrifices to ensure that my siblings and I received an education have led me to hold this path. I am forever grateful to God for giving me the two greatest parents. Then I must acknowledge the support and love of my dear wife, Taflh, who tolerated the eccentricity of seemingly endless research and reading, investigating and information processing, and the many of those dark late nights that became splendid sunrises. To my children, Horiyah, Sultan, Rashed, Sheemah, and Bassel, I love you all very much. Your presence in my life is the greatest support without you realizing it; when I look at you, my enthusiasm for further advancement is multiplied. The research took me from you for a long time, and it is time for me to come back and get together.

To my advisor, mentor, and supporter Professor. Tiffany A. Koszalka, Prof. Koszalka is not only an exceptional professor; she is also a remarkable mentor. Her support, encouragement, and guidance throughout this process have been invaluable, and I will always be thankful. I would like to thank my committee members Drs. Gerald Edmonds and Aadil Askar, and the outside readers Drs. Derek Xavier Seward and Bong Gee Jang. Each of you offered valuable contributions, encouragement, and leadership. I would thank the faculty and staff members in the Instructional Design, Development and Evaluation program who stretched my mind and horizons, especially Dr. Jing Lei, the IDD&E chair, you have always given me thoughtful advice and support. I would also like to acknowledge the two best office coordinators I have ever worked with in my professional life, Rebecca Pettit and Maryann Barker, I cannot describe my admiration for your dedication to work. I also would thank all my colleagues in IDD&E who have joined me in the journey of knowledge.

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## GLOSSARY OF TERMS AND ABBREVIATIONS

The following terms, definitions, and abbreviations are taken from the most frequently used publications, and it is acknowledged that these terms may have different meanings from one publisher to another.

Term	Definition	Abbreviations /Acronyms
<b>Philosophical assumptions</b>	In philosophy in general, there are many assumptions, but in research, the focus is on three types which are the ontological, epistemological, and axiological assumptions (Crotty, 1998; Rust et al., 1999)	<b>3Ps</b>
<b>Paradigms</b>	The worldviews or general perspectives that break down the complex details of the real world as a general set of beliefs on which actions are based (Avramidis & Smith, 1999).	
<b>Praxis</b>	Practical applications and techniques that seek to achieve specific objectives that are logically linked to a specific theoretical framework (Peters, 2018).	
<b>Ontology</b>	In philosophy, it means the study of existence, but in research, it means that (data/findings) are perceived as one reality or multiple realities (Creswell & Plano Clark, 2018a; Crotty, 1998; Rust et al., 1999).	
<b>Epistemology</b>	In research, the epistemic assumption focuses on the nature of the data, whether it is obtained from an objective or subjective point of view (Crotty, 1998; Saunders et al., 2019)	
<b>Axiology</b>	Axiology is concerned with the value of research and the researcher, and value can be neutral, driven, or laden (Saunders et al., 2019).	
<b>Advance organizer</b>	It is a learning tool characterized by abstraction, generality, comprehensiveness, simplify complex concepts, and linking previous knowledge with new knowledge (Ausubel, 1960, 1978; Searls, 1983).	<b>AO</b>
<b>Validation</b>	Procedurally, the researcher adopts in this study the prevailing statement of Maxwell (1992, p. 284) that "validity is not an inherent property of a particular method, but pertains to the data, accounts, or conclusions reached by using that method in a particular context for a particular purpose."	



## CHAPTER 1. INTRODUCTION

### Background and rationale

Research assumptions and beliefs affect the processes of composing, planning, conducting, and interpreting empirical works (Singh & Walwyn, 2017). These assumptions and beliefs indicate the preconceptions behind the foundation of scholarly works (Willis, 2007). Preconceptions can influence research outcomes significantly. Preconceptions and assumptions are generally learned over time from formal and informal contexts of subject-related readings, research methods literature, research experiences, and work experiences with other scholars or mentors (Scott & Usher, 2011). Assumptions, beliefs, and praxis in well-accepted research are developed through strong philosophical, theoretical, and practical foundations relevant to researched phenomena (Alogaily & Koszalka, 2020; Kivunja & Kuyini, 2017). Incorporating these elements of philosophy, theory, and praxis into scholarly work requires researchers to continually develop their understanding of a phenomenon of study from multiple perspectives and evolve as scholars able to fully define, explore, explain, and defend the practices and results of their inquiry.

Gringeri, Barusch, and Cambron (2013) suggested that philosophical assumptions and paradigms are often implicitly incorporated in research publications as the basis for the research process. However, Creswell (2007) posited that "good research requires making these assumptions, paradigms, and frameworks explicit in the writing of a study, and, at a minimum, to be aware that they influence the conduct of inquiry" (p. 15). Chalmers (2013) defined five observable components that makes a research paradigm a paradigm: "explicitly stated laws and theoretical assumptions; standard ways of applying the fundamental laws to a variety of situations; instrumentation and instrumental techniques that bring the laws of the paradigm to bear on the real world; general metaphysical principles that guide work within the paradigm; and general

methodological prescriptions about how to conduct work within the paradigm"(p.101). A study conducted by Makombe (2017) on a group of novice researchers and doctoral students concluded that there was a lack of understanding of the relationship between paradigms (and their components) and research praxis. Makombe suggested that the crucial reason for this lack of understanding is the literature's lack of adequate learning resources for developing novice researchers' thinking. Boyle (2019) stated in a recent study of interviews with doctoral students to determine the reasons for leaving their academic programs after the completion of courses that one of the main reasons is the difficulty in understanding the structure of research, especially aspects related to the theoretical, assumptions, and methodological framework. Crossan (2003) and Mills and Birks (2017), as cited in Baldwin (2014) also emphasized that there is limited literature related to the philosophy behind research design and the philosophical vision of researchers. Indeed, few references describe the essence of philosophy as critical to the inquiry at a level that the novice researcher can understand. It was also noted that "at the broader level, this confusion stems from the use of the term paradigm in everyday discourses in contrast to its use in the educational research" (Kivunja & Kuyini, 2017, p. 29). Paradigms greatly influence the formulation of the research problem and questions, which means that they directly affect the mechanism by which the data were collected (Kivunja & Kuyini, 2017). Overall, the lack of literature that clearly describes and advocates for philosophy, praxis, and paradigm as crucial components of research, as observed in Baldwin (2014), Kivunja and Kuyini (2017), Kalman (2019), and Makombe (2017) suggest that novice researchers are inadequately prepared to conduct rigorous research.

### **Problem statement**

In the existing literature, and as highlighted above, literature related to philosophies, paradigms and their relationship to research praxis in inquiry are limited. Novice researchers often

struggle in understanding the connotations of philosophy, paradigms, and praxis and their relationship to each other in defining, conducting, interpreting, and defending research (Kivunja & Kuyini, 2017; Makombe, 2017). Accordingly, many authors, such as Ponterotto et al. (2017), Makombe (2017), Stanley (2006), and Spirkin (1983) recommend that researchers, especially novices, be made aware of the logical and philosophical assumptions of research to help them identify general principles for theoretical thinking and practical applications. This awareness will aid researchers in obtaining a set of possibilities for their inquiry that contribute to better known reality and present their inquiry in a rational interpretation that reflects the objectives and limits of their research. Nevertheless, some reject to use paradigms in inquiry and consider it unnecessary and a dilemma for researchers. At the same time, those people who adopt the idea of paradigm rejection are using a paradigm in their decision and work unconsciously which may be, in this case Scepticism/Skepticism or Cynicism (D. T. V. Chen et al., 2016; Makombe, 2017; Richard, 2018). Thomas S. Kuhn in *The Structure of Scientific Revolutions* stated, *"The decision to reject one paradigm is always simultaneously the decision to accept another, and the judgment leading to that decision involves the comparison of both paradigms with nature and with each other"* (Kuhn & Hawkins, 1963, p. 77) .

However, among the adverse effects resulting from the researcher's lack of awareness of the philosophical assumptions is the occurrence of 'method slurring', 'methodological muddling' or 'sloppy research' (Beattie, 2002). These occurrences describe the tendency of researchers, who combine different approaches or use a specific approach, without adequately recognizing the paradigms and assumptions that supported their decisions and data results (Beattie, 2002). Such scholars as Creswell and Creswell (2018), Guba (1981), B. Johnson and Christenen (2019), Leavy (2017), M. Williams (2005) clarified that the researcher's lack of awareness of philosophical

assumptions and their applications in research might undermine the confidence in the rigor and trustworthiness of research. Stanley (2006) and Ponterotto et al. (2017) added that failure to disclose the philosophical position in research explicitly could lead to ambiguity in understanding its phenomena, and is often a result of a researcher's limited, if not erroneous or superficial, understanding of paradigms undergirding scientific or social research. Thus, the philosophical perspective is “something personal that drives the way research is conducted; it is underpinned by ontological and epistemological leanings and influences how a researcher creates knowledge and derives meaning from their data” (Moon & Blackman, 2014, p. 1173). Therefore, it is clear that sound research should encompass Philosophical Assumptions, Paradigms, and Praxis, which in this study is collectively referred to as the (3Ps) of research.

The research problem addressed in this dissertation is that novice researchers lack an understanding of Philosophical assumptions, Paradigms, and Praxis (3Ps) and their applications to research. As a result, the lack of understanding and application of the 3Ps by novice researchers undermines confidence in the rigor and trustworthiness of their research. The concept of understanding procedurally in this study is the awareness and knowledge of the researchers of the concept of the 3Ps and their relationship to each other and the details behind the value of their application in research.

### ***A potential solution***

The rigor and trustworthiness of novice researcher works may be enhanced by helping them develop a stronger understanding of the 3Ps (Baldwin, 2014; Kalman, 2019). Learning and practicing the 3Ps in research endeavors may be enhanced by using an advance organizer to simplify and illuminate these concepts for novices and students (Huifen & Tsuiping, 2007; Y.-H.

Liu, 2006). Huifen and Tsuiping (2007) found that advance organizers promoted meaningful learning where learners visualized, understood, and prepared to learn complex content.

According to Daniel (2005), advance organizers prepare learners to activate and build schema for successful learning. This study assumes that an advance organizer can scaffold novice researchers' thinking about their abilities to design, conduct, analyze, interpret and defend their research from philosophical, paradigmatic, and praxis perspectives, and aspire to help them make better research decisions and be more prepared to defend their work. Once the design features of the advance organizer are validated, it is assumed that the advance organizer will contribute to informing novice researchers and graduate students about applying the 3Ps through research curricula.

### **Philosophical assumptions, paradigms, praxis (3Ps) of research**

The broad range of research elements, including the philosophical assumptions, paradigms, and praxis, are collectively referred to as the 3Ps. Philosophical assumptions are the implicit, or explicit, starting point for research (M. Williams & May, 1996). Philosophical assumptions are the use of abstract thoughts and fundamental rational assumptions that inform research (Creswell & Poth, 2017b), and are exemplified by axiology, epistemology and ontology (Mingers, 2003). For example, the focus of research in the ontological philosophical proposition is on determining whether the data perceives it as a single reality or multiple realities. As for the epistemological philosophical assumption, the focus is on that the data were obtained from an objective or subjective point of view.

Paradigms refer to the worldviews that shape a research topic's fundamental set of beliefs and thoughts that guide the researcher's actions (Guba & Lincoln, 1994). Paradigms include the theories of the social and applied sciences and their associated research frameworks like positivist

and constructivist paradigms (Creswell & Poth, 2017b; B. Johnson & Christensen, 2019). For example, when the reality is "one" in the ontological philosophical assumption, one of the paradigms that correspond to this belief is a positivist paradigm, so the paradigm differs according to the researcher's view of reality. Although many researchers and practitioners ignore this foundational layer of philosophical assumptions, it is an inherent component of the paradigm (Willis, 2007).

Praxeology describes the theory and study of "praxis," which means a reflection in, on, and within human actions, and incorporating this reflection into the context of practice, in which authority and morality are the basis for trying to understand reality (Leavy, 2017a). Praxis is the practical applications and techniques that seek to achieve specific objectives that are logically linked to a specific theoretical framework (Peters, 2018). According to Pascal and Bertram (2012), praxis can be described as a process of selected research and a combination of theory and action. Praxis may include research objectives, methods, and approaches (Leavy, 2017a). For example, if the researcher believes that the reality of the study is "one" and uses the positivist paradigm as a lens to look at reality, then the appropriate investigation method for that is through the quantitative method, as well as the data analysis approach is based on the deductive approach. It is evident from the previous examples that the study results differ according to the different objectives of the study, which naturally leads to the difference in the methodology of the study. Palagolla (2016) emphasizes that the debate over the adoption of a particular research method does not depend only on the researcher's free will but also on the philosophical assumptions upon which the research is based. This means that the 3Ps are each individual, and together collectively, critical elements of scientific research (Van Der Walt & Potgieter, 2012).

The philosophical assumptions, paradigms, and praxis have a collective significance in scholarly work because together they form the philosophical background or the worldview of the research problem and the actions and practices necessary to study a research problem adequately. This worldview with scientific paradigms allows researchers to demonstrate the critical nature of their study. It is a unique framework that guides an inquiry, and it is incommensurable with others (Phillips, 2014).

Many scholars such as Creswell and Poth (2018), Crotty (1998), Guba and Lincoln (1994), John Dudovskiy (2018), Johnson & Christensen (2019), Rust et al. (1999), and Scotland (2012), emphasize that philosophical assumptions, paradigms, and praxis are essential considerations for any research and a solid foundation upon which the researcher rests in the rationale for research findings and procedures. Moon and Blackman (2017) suggest that researchers from the outset should understand the importance of the philosophical foundations of a study and its function in research procedures and the interpretation of the results. The three dimensions of research philosophy include ontology, epistemology, and axiology. Ontology is the dimension that is interested in studying the being – what exists in the world that can be learned by humans, while epistemology is interested in studying knowledge – the aspects of validity, scope, and methods of knowledge acquisition (Leavy, 2017a; Moon & Blackman, 2017). Axiology is interested in the study of value, which is the value of the research being done (Saunders et al., 2019). Axiology is concerned with the value of research and the researcher, and value can be neutral, driven, or laden.

Each dimension of philosophy may draw different research questions, methods, and interpretations of results, while research paradigms guide the assumptions, values, norms as well as beliefs held by a researcher (Kivunja & Kuyini, 2017).

The third P, research praxis, is interested in such areas as research objectives, research approaches, research methods, data collection, data interpretation, and methodology (Leavy, 2017a). Considering the praxis in research, the literature abounds in a debate between quantitative and qualitative methods that have been so divisive that some graduate students who graduate from institutions with a hope to gain a job in the world of academia or research are left with the impression that they have to pledge allegiance to a specific school of thought or the other (B. Johnson & Onwuegbuzie, 2004a). These methods strongly influence questions and interpretations of results. It can be said that considering all components of 3Ps equally in developing research is crucial (Kivunja & Kuyini, 2017; Makombe, 2017; Stanley, 2006).

Since the philosophical assumptions, paradigms, and praxis of research should be considered equally in a research paper, it should be clarified that missing any of the 3Ps presents the risks of reducing the rigor and trustworthiness of the research. For example, when the research paradigm is unclear, it is difficult to understand the research's purpose and intent (Bhattacharjee, 2012). As well, if a research philosophy is not visible, it is challenging to develop a sufficient research foundation in terms of research strategy, problem formulation, and data collection/processing/analysis (Žukauskas et al., 2018). Poor research praxis makes it challenging to define the practical activities required to study a specified phenomenon and produce specific findings (Lather, 2018; Leavy, 2017a).

In the end, well-accepted research is framed by the worldview assumptions of the researcher, paradigms that suggest the criticality of the study, and methods that assure rigor and trustworthiness results. Therefore, it can be said that the 3Ps need to be incorporated into the curriculum to expose learners to the essential elements of research.



## **Research education and curriculum**

Pascal and Bertram (2012) suggested that the current education system favors praxis over the other two elements of 3Ps. Rasanen (2008) viewed praxis as an old and highly used idea that was primarily utilized in pragmatists' research endeavors where researchers failed to align their research practices correctly with the relevant paradigms and philosophical assumptions. Case and Huisman (2015) also suggested that the research curriculum was highly focused on praxis because it is a highly common term in research curriculum, whereas philosophy and paradigm attracted much less focus and were rarely used terms in research literature. In a recent study conducted by Alogaily and Koszalka (2020), a sample of 520 research references using both manifest and latent semantic analysis was taken to describe how the main elements of research were indicated and presented in research literature. Each reference was treated independently and considered a sample, so there was an adequate sample in order to generate degrees of freedom for statistical analyzes. The study showed that a majority of research literature (71.9%) provide content on research praxis such as research methods, data collection, and data analysis techniques, while only 28.1% provided content on paradigms and philosophical foundations as critical aspects of researcher thinking.

These inquiries suggested that novice researchers are prepared fairly well with research methods (praxis) for specific types of research, but they often suffer from weaker preparation in philosophical foundations and scientific paradigms (Alogaily & Koszalka, 2020; Kivunja & Kuyini, 2017; Makombe, 2017; Stanley, 2006). Thus, novice researchers often lack the ability to fully explain and support their research against similar and distant studies (Baxter & Jack, 2008). Antonenko (2014) observed that lack of curriculum (and literature) to teach novice researchers on

the 3Ps reflects a deficiency in researcher analytical and logical thinking, which limits novices' abilities to design, modify, and justify their research.

### **A Potential New Learning Resource to Bolster Preparation in 3Ps: Advance Organizer**

The literature on the practices of research provides insights into critical elements of well-accepted research - 3Ps. Patterns of conversation in the literature favor the praxis element, suggesting inadequacies on the research curriculum to prepare novice researchers in the elements of philosophy and paradigms (Casanave & Li, 2015; Shah & Al-Bargi, 2013). This literature-based gap indicates an opportunity to support and enhance the research curriculum. One goal is to determine how to scaffold novices into thinking about and developing knowledge in the philosophies and paradigms that can strengthen their research competencies to conduct, interpret, and defend solid research.

A potential solution is to create and validate an advance organizer that visually lays out the 3Ps and their critical relationship to research. Advance organizers act as a roadmap that guides a novice through the new content to be learned, and is included at the beginning of the lesson to activate prior knowledge or build an overview of a high level of knowledge (Clark & Lyons, 2011). There exist multiple descriptions of advance organizers from existing scholarly works.

Many authors have attempted to describe advance organizers. Tergan and Keller (2005) define it as a pre-structured learning strategy that uses visualization to help learners comprehend a complex domain of a subsequent unit of study. The advance organizer has received the attention of researchers and specialists in instructional design and psychology for decades. Grabowski, Beaudoin, and Koszalka (2016) also emphasized that instructional designers must be well versed in instructional message design that can facilitate development of resources for different types of learning. This does not suggest that designers should be transformed into production or IT

specialists, rather suggests that it is extremely important to prepare designers with strong competencies to help them identify performance problems and their causes, and then align the content, learning and teaching strategies, assessments, learners' characteristics, environment and techniques that can be accessed in the instructions aimed at bridging specific performance gaps.

Today, educators in research curricula can utilize these age-old tools to train novice researchers on the 3Ps being addressed in this study. By developing an advance organizer that logically presents the 3Ps, this tool may provide a paradigm shift in developing the understanding graduate students and novice researchers have toward the 3Ps and churn professionally-developed research works. In the end, this work can accomplish the need to enhance the curriculum with an advance organizer that lays out and visualizes the relationships between good philosophy assumptions, paradigms, praxis, and good rigorous/defendable research.

### **Purpose of the study**

This study aims to achieve four main objectives:

1. To describe instructional design experts' opinions on applying the multimedia learning principles in the advance organizer of the 3Ps.
2. To describe the opinions of instructional design experts of the overall advance organizer of the 3Ps as a helpful learning tool.
3. To explore novice researchers' perceptions about the 3Ps in the research.
4. To describe novice researchers' impressions about the application of the 3Ps advance organizer into their research thinking and practice.

To achieve the research objectives, this study will be conducted in two consecutive phases. During the first phase, a Delphi technique will be used to provide evidence demonstrating instructional design experts' agreement on the use of multimedia learning principles incorporated

into the 3Ps advance organizer and the experts' opinion of the overall 3Ps advance organizer as a helpful learning tool. In the second phase, a phenomenological study will be used by conducting semi-structured interviews with novice researchers to explore their perceptions about the 3Ps and describe their impressions about applying the 3Ps advance organizer into their research thinking and practice. A phenomenological study is a "composite description that presents the 'essence' of the phenomenon, called the essential, invariant structure (or essence)" (Creswell, 2007, p. 82). The purpose of a phenomenological study is to obtain a rich description of individual experiences of such phenomenon to a description of the basic 'essence' of that experience for all of the participants (B. Johnson & Christensen, 2019). This methodology is further explained in Chapter 3.

### **Research questions**

This study attempts to answer the following research questions

#### **Phase 1: Validation study of instructional design of advance organizer**

1. To what extent do instructional design experts agree that the multimedia learning principles were used in the 3Ps advance organizer?
2. To what extent do instructional design experts agree that the overall 3Ps advance organizer is a helpful learning tool?

#### **Phase 2: A phenomenological study**

3. What are the novice researchers' perceptions of philosophical assumptions, paradigms, and praxis in research?
4. What are the novice researchers' impressions about using the 3Ps advance organizer into their research thinking and practice?

The answer to these research questions along with the methodology identified will provide distinct evidence about the competence of an advance organizer of philosophical assumptions,

paradigms, and praxis as a learning tool for novice researchers. The literature mentioned previously indicated that novice researchers struggle to understand these three elements and their relationship to each other when defining, conducting, interpreting, and defending research. Also, several research experts have indicated that novice researchers' lack of understanding and application of 3Ps may undermine confidence in their academic research's rigor and trustworthiness. The next chapter will provide a more detailed explanation based on what has been covered in the literature on philosophical assumptions, paradigms, and praxis, focusing on the importance of the problem of this study and striving to bridge this critical gap in the literature.

## **CHAPTER 2. REVIEW OF THE LITERATURE**

### **Introduction**

It has been argued that expert researchers produce works that are based on their philosophical assumptions and guiding paradigms and are enacted through supportive praxis. The literature on research practices places great emphasis on praxis and spends much less space on researcher philosophy and paradigmatic frameworks, thus suggesting instructional materials and readings for novices fall short in fully preparing researchers. This ultimately makes it difficult for novice researchers to produce research that is trustworthy and rigorous. This study investigates the use of an advance organizer to help novice researchers better understand the importance of the 3Ps and how to apply the 3Ps into their research thinking and practice. As mentioned in the first chapter, many search terms have been used and defined interchangeably in the research literature despite the existence of a fundamental difference between them, whether on the theoretical or practical side. Paradigm, philosophical propositions, worldviews, method, methodology, conditional framework, and theoretical framework are among those terms that novice researchers have difficulty understanding and their relationship to research. Therefore, in this chapter, highlights of the literature on these concepts and topics related to the study will be presented including philosophical assumptions, philosophical worldviews, praxeology, applications of 3Ps in research, and the concept of the advance organizer and related theories.

### **Philosophical assumptions**

According to Mack (2010), Wong, Musa, and Wong, (2011), in the research environment, philosophical assumptions form the philosophical domain that helps in understanding the socio as well as the historical background of the researcher (Wong et al., 2011). According to Kaushik and Walsh (2019), Mingers (2003), the three major philosophical assumptions of interest in research

include ontology, epistemology, and axiology. In this case, according to Kaushik and Walsh (2019), Scotland (2012) ontology is concerned with the nature of reality while axiology comprises the beliefs concerned with the role of morals and values in research. More specifically, the ontological philosophical assumption focuses on determining whether the data is perceived as a single reality or multiple realities, while the epistemic assumption focuses on the nature of that data was it obtained from an objective or subjective point of view (Saunders et al., 2019) . Moreover, as stated by Mack (2010) epistemology is about how people know the world, knowledge acquisition, as well as the connection between the knower and the known. According to Creswell (2012) and Jackson (2012) researchers should consider using the appropriate philosophical underpinnings in their research projects because the practice plays a significant role in determining the research design as well as explaining actions taken to increase the credibility of outcomes recorded in research.

On the other hand, concerning epistemology, Kivunja and Kunyini (2017) observed that it helps a researcher in positioning themselves in the context of research so that to discover the new knowledge based on what is already known. This is primarily important in higher education research due to the inherent role that discipline has on the contribution to knowledge. Besides, Kivunja and Kunyini (2017) viewed the ontology assumptions as the basis for a researcher to orientate themselves in order to think about their research problems, significance and the approach to be observed in exploring the research problem. Moreover, Kivunja and Kunyini (2017) explained that philosophical assumptions help the researcher establish how they can make meaning of the data that they gather. These observations were echoed by Baldwin (2014), who explained the need for philosophy in Ph.D. research and programs. In the article, Baldwin (2014) observed that Ph.D. scholars cannot transit from being learners to full-time researchers without first gaining

advanced knowledge on philosophy of research. Crotty (1998) rationalized that philosophy seeks truths in research based on the existing understanding of expressions and associated concepts. By exploring philosophical assumptions of research, the study will investigate the existing understanding of expressions and concepts to seek important truths based on the philosophy of research (Denzin & Lincoln, 2017). Thus, an understanding of the philosophical foundations can help Ph.D. students and novice researchers become better thinkers and rationalizers for their work rather than methodological specialists who cannot derive the philosophy behind their research endeavors, nor can they fully rationalize or defend their works. As reported by Antonenko (2014), this will help create a breed of research professionals whose research findings will be practical.

### **Philosophical worldviews (paradigms)**

According to Sefotho (2015), philosophy has existed for the last two millennia, and it is the origin of all disciplines where it is applied to produce what is generally referred to as the philosophy of science. Sefotho (2015) observed that most learners have difficulties expressing and using philosophical underpinnings in their dissertations and theses, which is especially demonstrated in most social and scientific research studies. Research paradigms can be described as the worldviews or general perspectives that break down the complex details of the real world (Avramidis & Smith, 1999). Avramidis and Smith (1999) further stated that paradigms are embedded in the adherents' social lives, where importance, reasonability and legitimacy of such general practice can be observed. They further explain that paradigms are normative and only explain what the practitioner should do without the necessity of the long existential consideration and thus they can be described in simpler terms as a general set of beliefs on which actions are based (Avramidis & Smith, 1999). There are dozens of paradigms around the world, and Table 1 shows examples of some of those paradigms.



*Table 1. examples of some paradigms/worldviews*

Examples of some paradigms/worldviews		
Dialectical pluralism	Constructivism	Altruism
Dualism	Deconstructionism	Asceticism
Essentialism	Empiricism	Cognitivism
Idealism (Abstract Entities)	Externalism	Consequentialism
Materialism	Fallibilism	Cynicism
Metaphysics	Foundationalism	Deontology
Monism	Historicism	Egoism
Naturalism	Holism	Epicureanism
Nihilism	Instrumentalism	Ethical Naturalism
Nominalism	Internalism	Ethical Non-Naturalism
Objectivism	Logical Positivism (Logical Empiricism)	Ethical Subjectivism
Phenomenology	Ordinary Language Philosophy	Eudaimonism
Physicalism	Parsimony (Occam's razor)	Moral Universalism
Postmodernism/ Transformative	Phenomenalism	Humanism
Realism	Positivism	Individualism
Reductionism	Pragmatism	Moral Absolutism
Relativism	Rationalism	Moral Anti-Realism
Solipsism	Representationalism	Moral Nihilism
Subjectivism	Scepticism (skepticism)	Moral Realism
Virtue Ethics	Reflexivity	Moral Relativism
Utilitarianism	Non-Cognitivism	Moral Skepticism

According to Avramidis and Smith (1999), it is necessary for researchers to understand paradigms and paradigmatic assumptions because of the implications it has on the research being conducted. This is because it helps researchers make relevant decisions concerning research methodologies and helps them in identifying the most appropriate paradigmatic stance that fits their research approach (Avramidis & Smith, 1999). It should be noted that according to Kuhn (1996) and Kuhn and Hawkins (1963), renowned advocates of paradigms, specific paradigms associated with specific scientific revolutions are incommensurable because a paradigm involved in different sides of a scientific revolution is completely unique and cannot be compared with its

counterparts for similarities (Phillips, 2014). However, Gage (1989) used the term “oppositional components of paradigms” rather than *incommensurability* of paradigms because the latter has been defined differently by numerous scholars e.g., (Devlin & Alisa, 2015; Kuhn, 1996; Kuhn & Hawkins, 1963; Lincoln, 2010; Ritzer & Gutting, 1982). Gage (1989, p. 148) defined this oppositional component as the assumption that “any paradigm inherently implied an opposition to alternative paradigms.” However, Kuhn's theory is too relativistic to explain the phenomena of the unique particulars of specific paradigms. Indeed, Kuhn used the term ‘paradigm’ in two different senses; first, paradigm represents “the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community” (Kuhn, 1996, p. 175). This is an understanding of paradigm from a sociological lens that concentrates on the social sciences, beliefs, and methods of a particular scientific community. Second, paradigms are the “concrete puzzle-solutions which, employed as models or examples, can replace explicit rules as a basis for the solution of the remaining puzzles of normal science” (Kuhn, 1996, p. 175). In addition, the reference of Kuhn (1996) to paradigm matches specific politic revolutions, which makes it difficult to link his explanations to research and scientific revolutions. In the educational research environment, Kuhn's (1996) ideas seem to define paradigms as ways of conducting research – much more like related methods of performing research. For example, they may mean the methodological outlooks used in research – interpretivism, postpositivism, as well as constructivist paradigms of research (Phillips, 2014). In the world of research, it is possible to mention multiple worldviews that can be described under three main assumptions, namely ontology, epistemology and axiology. It is important to know that the list of paradigms under each assumption presented below is not exhaustive of all paradigms and is subject to change according to the data provided by the literature and assumptions on which it is based.

## **Paradigms under the ontological assumption**

Brown and Dueñas (2019) stated that research paradigms form a set of beliefs and practices that researchers observe to derive guidance concerning inquiries in various disciplines. In this case, and according to Brown and Dueñas (2019), research paradigms shape researchers' approach to different activities involved in the research process. According to Barbara and Giddings (2002), novice researchers must understand research paradigms for them to understand how to develop relevant research articles and be able to read and appreciate the existing works of research. This observation is repeated in Elshafie (2013) where the authors explain that novice researchers have significant difficulties choosing the appropriate research paradigms and research methodology for their research projects. In another article by Durham, Sykes, Piper, and Stokes (2015), novice researchers find it difficult to choose the research paradigms and compatible research methodologies correctly to be used in their research practices and the ambiguity brought about by the new research experience. This, according to Durham et al., (2015), makes it a challenging experience for novice researchers to conduct educational research projects successfully. Dozens of paradigms exist in the literature that is consistent with ontological, epistemological, and axiological assumptions. In the following list, an effort is made to provide brief definitions of the paradigms most commonly used in academic research, and that has been used in the proposed advance organizer in this study:

***Postmodernism/Transformative:*** while objective reality exists, this view maintains that no objective moral value exists (Schwandt, 2015). As Sim (2012) highlights, postmodernism is a general disregard of the cultural certainties that have formed the foundation of the Western society of the past centuries. It is a disregard of the elemental objects existing prior to the century, thus striking agreement with Schwandt (2015).

**Realism:** the position of this philosophy is that all that is perceived by the mind is real and true and not a mere illusion (Devlin & Alisa, 2015). From Galloway's (2013) perspective, there exists an external world founded on belief systems, language, and thoughts that are independent. While highlighting that human possess little direct access to knowledge about that world, Galloway (2013) augers the sentiments of Devlin and Alisa (2015) on the existence of entities beyond human imagination.

**Relativism:** ideally, this view suggests that while there exists no universal truth to an idea, outlook is dependent on the culture society, and contextual meaning. Thus, there is no absolute truth (Devlin & Alisa, 2015). Paleček and Risjord (2013) observed that the characterization of relativism is indicative of dependence. Hence, there is no absolute truth.

**Constructivism:** suggests that knowledge is built from the sensory experiences in the natural world, leading to the formation of mental constructs (Boychev, 2015). According to Bagnoli (2013), the testimony of factual elements serves as an opportunity for knowledge formulation.

**Positivism:** the fundamental conception in this that knowledge is drawn from natural phenomena granted that the properties and relations can be interpreted through logic and reason (Schwandt, 2015). As Weinberg (2013) observes, verifiable data, therefore, is the foundation of valid knowledge.

**Pragmatism:** the term regards words and human thought as the tools to be used seeking solutions, accepting and rejecting concepts, prediction, and, particularly through thought, offering descriptions and representative notions (Brinkmann, 2017). Ideally, this is through action, change, and the interaction between knowledge and action.

***Moral absolutism:*** mainly, this observes that truth, reality, and morality as absolutes for every individual in space and time in spite of their culture or cognition (Nuccetelli & Seay, 2012). While speaking against the concept, McMahan (2008) observed that treatment of morality as a contrast between humanity and barbarism fails to sufficiently support upright societies and in effect, promote degradation.

### **Differences between paradigms and theories**

Although a layperson may not be able to define both paradigms and theories, a researcher of any level of expertise should not have this difficulty because these definitions have been developed over time, thus suggesting a distinction between paradigms and theories. Nonetheless, both theories and paradigms are inseparable in their use in explaining scientific and academic concepts of different phenomena. According to Egbert and Sanden (2013), and L'Abate (2012), theories explain phenomena based on specific criteria, while paradigms explain the background in which a theory can be tested/measured. Egbert and Sanden (2013) described the term paradigm based on ideas brought forward by Thomas Kuhn, who described a paradigm as a set of concepts/thought patterns that influence the fields of science and philosophy. In the description, Egbert and Sanden (2013) added that paradigms are behind theories. According to L'Abate (2012), a theory forms an explanation of the world happenings based on logical or scientific facts. He also added that when several theories merge in their descriptions of phenomena to form a paradigm, thus making paradigms broader than theories. Further, according to L'Abate (2012), theories are well-established logical principles that are based on scientifically-sound evidence. Theories provide explanatory capacities to help understand and predict events. L'Abate (2012) further described a paradigm as a principal conceptual framework that helps a person to understand the world around them. Therefore, the paradigm is broader than theory and paradigms are subject to

change and transformation throughout the ages. Thomas Kuhn in his book "The Structure of Scientific Revolutions," mentioned the idea that science passing through periods called "natural sciences," when current paradigms dominated the scientific world, the cognitive revolution generated a new view of reality that changed the prevailing pattern of seeing reality and "shifting" from one reality to another. Then, the new paradigm then becomes impressive in its content when it transpires in sciences that appear defined and stable (Kuhn, 1996; Kuhn & Hawkins, 1963) . Another difference between theories and paradigms, as observed by Jackson (2012), is that the former can be tested through research, while the latter cannot be tested through research, but it directs the research topic being investigated. In the same vein, theories can be predictive or explanatory and with a narrower range of concepts compared to paradigms.

### **Praxeology (praxis)**

When conducting research, the researcher ought to understand the principles of praxeology in order to craft a considerably scientific research process. According to Sorinel and Marian (2008), praxeology can be described as the science aspect that explains human conduct as well as action. It is interested in the aspects of human activities that may be grasped a priori – the logical conceptual implications as well as logical implications of choice, preference, and means-end schemes, amongst others. In this case, people act using some means in order to achieve specific outcomes (Sorinel & Marian, 2008). On the other hand, praxis as a term denotes the process of enacting a theory, philosophy or idea in practice in order to translate an introspective into the existential or an idea into action (Share, 2012). According to Share (2012), praxeology is interested in the synthetic a priori of human action as well as the logical effects about phenomena and epistemology, and therefore it draws from the elementary fact of nature of humans to act purposefully by utilizing scarce resources in order to achieve a specific end. It assumes that two

conditions must prevail for human action to occur. In this case, the first assumption is that the goal of an action is time-invariant as well as ultimately given, while the second assumption is that the actor is capable of interfering at an early stage in order to remedy a future state of perceived disutility (Share, 2012). To sum much of the existing literature about praxis, Kemmis (2010) views praxis as the element of research that serves two purposes, namely, guiding the development of education and guiding the development of educational praxis. In this section, the review seeks to understand praxeology and praxis of research by exploring literature to understand more about research objectives, research approaches, research methods, data collection and analysis, data interpretation, and methodology.

### **Research objectives**

As observed in the previous section, human action is driven by the urge to achieve a specific outcome, which is the purpose of any effort (Sorinel & Marian, 2008). In research, the purpose highlights the objects of following a specific praxis with a view of attaining some outcomes or research objectives. Determining the research objectives is the actual starting point for conducting research after the researcher's curiosity developed towards a phenomenon (Nishishiba et al., 2014). Without objectives, a research process cannot meet a meaningful end (Thomas & Hodges, 2010). Both qualitative and quantitative and qualitative research approaches have five standard objectives. These are exploration, explanation, description, prediction, as well as an influence (B. Johnson & Christensen, 2019). Exploration as an object of research is interested in the use of inductive methods in order to explore a concept, phenomenon, idea or construct so that the researcher can provide a tentative hypothesis, hunch, or inference about the subject being investigated (Kothari & Garg, 2019). On the other hand, explanation study is interested in expanding theory or developing an existing theory so as to explicate the relationship of various

concepts, phenomena or constructs about the primary subject of interest in the research in order to ascertain reasons behind the occurrence of some events, and according to many authors, this is the key purpose of science (B. Johnson & Christensen, 2019). In addition, description as a research objective involves the identification as well as the description of antecedents, nature as well as the etiology of phenomena under research (B. Johnson & Christensen, 2019). Moreover, prediction entails the use of the existing theory or knowledge in order to forecast things that would happen later in time, while influence as an objective is interested in the manipulation of various variables, settings or conditions in order to modulate desired or expected results (Gates et al., 2007). Identifying a clear research objective is easier said than done; it has been noted that novice researchers fall into the trap of focusing on what to do and losing track of the research objective (Nishishiba et al., 2014). According to Durham et al., (2015) novice researchers need to understand the research objectives for them to write advanced research papers in their research disciplines. Without understanding the specific elements of research methods, a novice researcher demonstrates difficulties producing papers for publishing in professional, peer-reviewed journals (Perneger & Hudelson, 2004).

### **Research data analysis approaches: Inductive, deductive, and abductive**

The three major reasoning approaches to research include inductive, deductive, as well as abductive research approaches. In a paper written by Verleye (2019), both deductive and inductive research approaches were described in depth. In this case, according to Verleye (2019), the deductive research approach is interested in exploring the more general information before narrowing down to more specific conclusions. This means that it starts with the existing theory before leading the development of a hypothesis before the subsequent use of observations to confirm facts concerning a phenomenon. Sometimes, the deductive research approach is referred



to as top-down approach because conclusions are only made based on logical premises or the available facts. On the other hand, the inductive research approach works based on specific observations in order to make broader generalizations as well as theories. It is sometimes referred to as a bottom-up research approach where observations are characterized to develop a specific pattern and guide the development of a tentative hypothesis as well as the subsequent development of a theory concerning a specific phenomenon. According to Verleye (2019), induction happens when a researcher moves from specific details to general details while deduction takes the opposite route where the researcher moves from the general details in order to achieve a specific conclusion. In a deductive approach, the researcher utilizes laws, accepted principles and rules to make reasonable arguments while in inductive approaches, arguments are based on observations. Nonetheless, induction presents an inherent problem that is related to the difficulties of justifying knowledge, according to Bendassolli (2013). According to Verleye (2019), philosophy as produced the differences between the two types of reasoning, namely, inductive and deductive reasoning, as indicated in this section. In this case, the science of deduction has been simplified as formal logic while inductive reasoning has generally been practiced in the field referred to as critical thinking or informal logic (Verleye, 2019).

Both the inductive and deductive research approaches have strengths and limitations. According to Barbara and Giddings (2002), one of the advantages of using deductive research approach is that it is a straightforward approach that goes straight to the point. It also respects the intelligence of the researcher by acknowledging the cognitive processes involved in the development and acquisition of knowledge. In addition, deductive research also approaches most rule aspects involved in a research process can be explained directly without necessitating the use of examples to elicit their importance. On the other hand, one of the disadvantages of deductive

research approach is that it nurtures the belief that knowledge acquisition is just a case of comprehending the rule. In addition, it is a complex approach for novice learners who cannot understand advanced concepts concerning the phenomena in the question. According to Point, Fendt, and Jonsen, (2017), the inductive research approach is interested in making learners aware of the rule discovery, which enhances their ability to become autonomous and self-reliant. This involves reasoning based on specific instances to derive general conclusions. It can be complete induction which means reasoning from all possible instances to a general conclusion, or incomplete induction which is reasoning based on some of the possible instances to a general conclusion (Gallagher, 1986). Another advantage is that the inductive research approach allows the learners to exploit a greater degree of cognitive depth. In addition, inductive research approach motivates researchers to remain active in the research process instead of simply being passive participants in the process. However, Barbara and Giddings (2002) state one of the disadvantages of inductive research approach is that it is both times- and energy-consuming for the researcher to arrive at the conclusions of the investigation. In addition, physical sciences and all systematic knowledge rely heavily on incomplete induction, and this presents a need to distinguish between incomplete induction and hasty generalizations (Jarvie & Zamora-Bonilla, 2011). This means that the philosophical question does not have to do with the rightness or wrongness of procedures within a scientific discipline, but the question of the status of the knowledge that can be reached based on a specific sort of procedure.

The third research data analysis approaches is an abduction, and according to Durham et al., (2015), abduction refers to the process of inferring a case based on a rule as well as a result, in order to develop knowledge. In this case, abduction starts with facts' consideration or consideration of specific observations, before proceeding to develop a plausible hypothesis that is

related to specific rule or fact. Therefore, abduction is interested in the correlation as well as the integration of facts in order to give a general description and drawing the relationship of the facts to the wider context. One unique feature of abduction as a research approach is that it is expected to cover both scientific inquiry and practical reasoning because the theory of abduction considers science as a special approach of sense-making in humans (Durham et al., 2015). Abductive research approach was first described by Peirce as the basic foundation of scientific inquiry where inferences provide the basis for broadening knowledge as well as stimulating the process of research (Fann, 1970; Verleye, 2019).

Just like both the deductive and the inductive research approaches, abductive research approach has several strengths and weaknesses (Meyer & Lunnay, 2013). One of the strengths of abduction is that it helps the researcher in forming associations to enable them in discerning relations as well as connections that may not otherwise be obvious or evident. In doing so, abduction helps the researcher in the formulation of new ideas about the research problem in order to utilize data existing far from the original theoretical premise (Meyer & Lunnay, 2013). Another advantage is the capacity of abduction to present an alternative way of data reinterpretation, which when used alongside reintroduction, leads to the development of a new theory or conceptual framework in the investigation of a research problem (Meyer & Lunnay, 2013).

On the other hand, according to Plutynski (2011), the abductive approach carries with it four different shortcomings. One of these limitations is the boundary problem, which demonstrates the difficulty of distinguishing abduction from other inference forms because of the blurry identification of what falls under the abduction approach. Often, researchers find it difficult to differentiate abduction from induction because of the grey area existing between the two approaches. Another limitation is the justification problem, which is generally the lack of a

plausible answer to whether abduction is a good inferential approach. Abduction exhibits a descriptive problem where it is generally difficult for a researcher to characterize the role of abductive inference in science and scientific processes. Moreover, according to Plutynski (2011), abduction also faces formalization because of the existence of more than two formalizations (one affirms consequent, and one is syllogistic), which leads to difficulty formalization due to lack of such type of inference. Despite the importance of abduction approach, the literature lacks references about it, Teddlie and Tashakkori (2012) stated that they solicited a chapter on abduction and mixed methods of the *Handbook of Mixed Methods*, but they were unable to find a knowledgeable author willing to write about it.

### **Research methods: Quantitative, qualitative, and mixed methods**

According to Ellis and Levy (2009), novice researchers and graduate students find it difficult to understand the intricacies of research methods and as a result, making them unfit for conducting a scholarly inquiry. By definition, a research method is described as the general approach taken by a researcher when carrying out a research project. Generally, research methods are broadly categorized as quantitative, qualitative and mixed research methods. According to B. Johnson and Christensen (2019), and C. Williams (2011), quantitative research methods are used when there is a need for data quantification in order to create meaning and also new knowledge. Unlike quantitative research methods, which rely on numerical data, qualitative research methods generally rely on textual data (Vogt, 2007). According to Schoonenboom and Johnson (2017), and Shorten and Smith (2017), mixed methods research entails combining the basic elements of qualitative and quantitative methods in order to derive a broad and deep understanding and corroboration concerning a phenomenon. Creswell and Plano Clark (2018a), and Morgan (2014) also clarified that mixed methods research involves the collection of both qualitative and

quantitative data to explore the same phenomenon. C. Williams (2011) observes that the quantitative research method involves the use of a numeric or statistical approach in the research design in order to create meaning based on the objectivity that is revealed through the collected data. Therefore, quantitative research is meant to explain and predict phenomena in order to discover, confirm, and validate relationships that could help in developing generalizations so as to contribute to the theory. In the quantitative research process, the researcher collects data in order to quantify information and subject it to statistical manipulation so as to support or refute different claims (C. Williams, 2011). Quantitative research methods can be classified into four broad categories, namely descriptive, intervention, causal-comparative, as well as correlational methods. In this case, descriptive research is interested in identifying attributes of a specific phenomenon in its current state. On the other hand, intervention research seeks to investigate a phenomenon based on the outcomes of interventional treatment of a subject while causal-comparative research is interested in the causal-effect relationship of variables and this is achieved by examining how independent variables interact with dependent variables (C. Williams, 2011). Correlational methods aim at exploring different characteristics of a phenomenon (D. Morgan, 2007, 2014).

According to Johnson and Christensen (2019), and Creswell and Creswell (2018), the intent of qualitative studies is to explore intangible evidence in order to understand a phenomenon. They are highly applicable in studying human behavior and action as they do not impose rigid standards compared to the quantitative methods. Qualitative research can be conducted using several methodologies, including narratives, grounded theory, case studies, phenomenology studies, and ethnographies, as explained in (Creswell & Creswell, 2018). Novice researchers face several problems with qualitative research especially lack adequate knowledge on the topic, inability to choose the most suitable data collection methods, building and maintaining rapport

with the respondents, and lack of capacity to place questions in order (Darmayanti et al., 2018). The third type of research methods of interest to a researcher in the mixed methods.

Mixed methods research has several purposes – five primary purposes. The first is triangulation, which means convergence, corroboration, and correspondence of the data/results from different methods (D. Morgan, 2007; Schoonenboom & Johnson, 2017). The second purpose is complementarity, which elaborates, enhances, illustrates, and clarifies different research methods (Greene et al., 1989). According to O’Cathain, Murphy, and Nicholl (2007), it is necessary for complex research areas where a single research method is not helpful. Development is the third purpose of mixed research as one research method helps develop another method based on sampling, implementation, and measurement decisions in the application (Bryman, 2006; Schoonenboom & Johnson, 2017). The fourth purpose is initiation, meaning discovering contradiction and paradox so that results from one method lead to changes in the other, and they could emerge rather than be planned or analyzed intentionally to obtain new information (Walshe, 2018). The fifth purpose of mixed-method research is expansion, in which different methods are used to extend both the range and breadth of inquiry in answering specific research questions (Greene et al., 1989). However, Creswell and Creswell (2018) explain that a researcher who wishes to develop a mixed study should understand various dimensions of mixed methods design without losing interest in maximizing the validity of their study. Overall, Morgan (2007) demystifies that using different research methods to explore a specific phenomenon combines strengths to produce objective results for complex phenomena. It is worth noting that Morgan (2019, n. 3) recently stated that "the editors of the Journal of Mixed Methods Research state they will no longer accept articles that rely on this terminology." Morgan attributes the reasons for this ban to the misapplication of the principle of triangulation on a large scale and its confusion with

the motives that led to the application of mixed methods with multiple methods. In the same vein, Morgan (2019) proposed to use "convergence" and "complementarity" for the two meanings that have become so entangled.

A mixed methods design has undergone many classifications over the years, and this has led to some confusion over the approaches supported by the literature. In Table 2, Creswell and Plano Clark (2018a) provided a table showing the typology of mixed methods design they used from 2003 to the current time.

*Table 2. Typology of mixed methods design, adopted by Creswell and Creswell (2018)*

2003 Typology (Creswell, Plano Clark, Gutmann, & Hanson, 2003)	2007 Typology (Creswell, Plano Clark, 2007)	2011 Typology (Creswell, Plano Clark, 2011)	2020 -Present Typology of Core Designs
Sequential explanatory	Explanatory design	Explanatory sequential design	Explanatory sequential design
Sequential exploratory	Exploratory design	Exploratory sequential design	Exploratory sequential design
Sequential transformative		Transformative design	
Concurrent triangulation	Triangulation design	Convergent parallel design	Convergent design
Concurrent nested	Triangulation design	Embedded design	
Concurrent transformative		Transformative design Multiphasic design	

In this table, it is clear that the change is related to the name, and some methods have been merged and others have been eliminated, and the authors have listed design names from their writings more closely related to the original typology they used in 2003 in order to better assist

researchers in understanding the main design options available. Although the early literature emphasizes the idea of embedding methods, the existing literature focuses on intersecting mixed methods within methodologies and frameworks.

### **Data collection**

Currently, the power of information has become more significant, given the increased reliance on data collection and mining entities (Norton, 1999; Plano Clark & Ivankova, 2018). While it is a majorly internet-based process, still, for businesses, academic organizations, and researchers, data plays a critical role in granting credence to propositions. However, Ng and Winkler (2014) observe that data is essentially raw figures and facts. Ensuring that it is meaningful, therefore, involves organization for contextual analysis and interpretation. As a systematic means enabling an entity to test hypotheses, answer questions, and even evaluate the outcomes, data collection is fundamentally dependent on the user's objective.

Quantitative data collection revolves around the gathering of data values in terms of their quantities thereby making them measurable while qualitative data collection technique, rather than being numeric, focuses on the description of the data items (Vogt, 2007). While the quantitative technique is seen as more reliable due to the statistical analysis granting credence to the data, the qualitative method enables the researcher to effectively enhance their observations by fundamentally referencing the data to color, texture, and other descriptive features (B. Johnson & Christensen, 2019). However, with an integration of the two, an emergent method emerges. Referred to as mixed methods, this technique, sustained by a single program of inquiry, combines qualitative and quantitative techniques to ensure a synergistic data collection process rather than when the two techniques are used independently of each other.



Fundamentally, Creswell (2007) maintains that the choice of a data collection technique is dependent on the questions the researcher wishes to address. During quantitative research work, the numeric nature of the process involves questions such as Who? What? When? Where? How many? By making these closed ended, it becomes easier to realize the elemental goals of research, thus enhancing the transformation into charts, numbers, and tables. Thus, by basing the data on mathematical calculations, the data can be understood in its tangible nature. On the other hand, qualitative data makes use of the “why” and “how” questions. Through its use of open-ended questions, the researcher manages to gather data that is descriptive, allowing them to gain insight into the participants’ conceptions, behavior, and thought process. Indeed, this process of collection is seen by Vogt (2007) as a means towards the determination of solutions to challenges, the precipitation of new ideas, and even the testing of the value of a concept. While the quantitative method is seen as more objective, with this method, data is deemed subjective. However, it is this that allows the researcher to increase the depth of their comprehension on the subject. With the mixed-method analysis, the researcher usually seeks to enhance their investigation through the completion of the process while ensuring that the interpretation has synergy.

### **Data interpretation**

While the sample size in the procurement of quantitative data may be large, it is crucial to observe that its reliability depends on its organization. Mainly, this is conducted to ensure that the numeric value of the information is effectively analyzed for functions such as prediction. Fundamentally, the process of interpretation varies. In some quarters, the data is done through identification. When carrying out a study, researchers may be interested in the number of people edging towards a particular notion. While getting their total number relative to the sample size, the study essentially carries out an identification process towards interpretation. Secondly, the

interpretation of quantitative data may be through the determination of both the significance and the function. For the former, the scholars seek to single out the emerging differences that have primary relevance in the comparison process (Antiwi & Hamza, 2015; B. Johnson & Christensen, 2019). As for the functional components, the researcher seeks to weigh the role the individual and collective data elements play in the research objective. Unless the data has value, it is futile to classify it amongst the relevant items.

Additionally, the qualitative research method heavily depends on the interpretation process to ensure the meaning is drawn from the study. While cognizant of the fact that human behavior is justified by distinct cognitive frameworks, qualitative research, in the process of interpretation, seeks to unearth the underlying basics to the data collected. With this technique, interpretation can follow a memory-recollection process with the researcher following a bottom-up approach or a top-down approach following suspicions on the intended meaning (D. Morgan, 2014). As the first approach assigns meaning without any additional theoretical concepts, it essentially manages to maintain closeness to the apparent meaning within the responses as possible. However, with the second, Mertens (2019) states that the researcher attempts to discover the latent meanings within the text as compared to the images directly projected.

Lastly, given that the mixed method approach tends to merge the strengths of the two approaches while minimizing the limitations, in the process of interpretation. Granted that triangulation involves the use of different methods to gather multiple data components, it is essential to observe that during interpretation, the researcher must address the prompts directly through the standards adopted in the actual method (Bekhet & Zauszniewski, 2012; Hussein, 2009). That is, if it is a data component with a qualitative value, its interpretation should follow

the standards adopted in the technique. Afterwards, these results should be, collectively absorbed in a bid to cater to the research questions.

## **Methodology**

Sometimes, the words methods and methodology are used interchangeably, but there is a significant difference between their respective applications in research. According to McGregor and Murnane (2010), and Mertens (2019) the methodology may be described in three different ways – the science of methods/relationship between methods; a technique used in research; and science of organization of activity. In other words, it is a systematic combination of the philosophical assumptions, the worldview used, and the mechanism by which the data were obtained (B. Johnson & Christensen, 2019). In research, a methodology is understood as the best justification of using a specific research method. On the other hand, the research method refers to either quantitative, qualitative, or mixed methods used in research.

In the same context of the terminology used interchangeably in the literature, it is worth noting to clarify that the difference between the concept of multiple methods and mixed methods lies in the methodology used to collect the data. More clearly, if two or more data collection tools, be they quantitative or qualitative tools, are used in one type of research method, then this is called multiple methods. For example, the converged or embedded quantitative data collected from various tools such as a questionnaire and empirical studies is called multiple quantitative methods (Creswell & Plano Clark, 2018a). This also applies to qualitative research, where if qualitative data are collected from multiple sources such as an interview and observation, this will be called multiple qualitative methods (Miles et al., 2013). But suppose two or more data collection tools are used to obtain quantitative and qualitative data; in that case, this is called mixed methods, for example, converging or embedding of (quantitative) data collected from the questionnaire with

(qualitative) data collected from the interview then this is called mixed methods (Creswell & Plano Clark, 2018a).

Over the last few decades, there has been mounting pressure concerning the quality of research being churned by new and experienced researchers, and according to Morgan (2014), and Norton (1999), researchers are encouraged to keep improving their research skills to be able to keep abreast with the prevailing research standards. According to Müller-Staub (2012), quality research is ensured by matching research problem, research paradigm as well as methods. According to Ellis and Levy (2009) in their agreement with Müller-Staub (2012), one of the biggest challenges that are affecting novice researchers is the difficulty matching research to the relevant research method, which has a wide range of negative impacts including failure to get accepted in the scholarly community. Further, according to Chen, Wang and Lee (2016), novice researchers and graduate students find it difficult to conduct literature reviews especially because of their poor understanding of the best and most applicable literature review methods to be used for their work. In a research conducted by Taskeen, Shehzadi, Khan, and Saleem (2014), novice researchers found it difficult to conduct research adequately because of lack of supportive library services, supervisor's lack of knowledge of research, substantial misleading data, lack of related literature, and people dropping out from samples. Novice researchers especially found it difficult to conduct qualitative studies because of various difficulties, including data collection, interpretation/analysis, respondent recruitment, building rapport with respondents, findings representations as well as the entire research process (Kalman, 2019). In some instances, novice researchers failed to provide quality results for their lack of comprehension of various elements of research methodology, and according to Grant and Osanloo (2014), most doctoral candidates found it difficult to understand the theoretical framework and its importance and application in research. The same sentiments are

shared by Barbara and Giddings (2002), Casanave and Li (2015), and Kalman (2019), where the authors observed that novice scholars do not have adequate skills to develop conceptual and theoretical frameworks in their dissertations and publications. In the same way, graduate students and first-time researchers also find it difficult to understand the intricacies of research methods (Ellis & Levy, 2009); and according to De-xin (2018), novice researchers face difficulties applying research methods in their projects, especially due to their inability categorize research methods and related terms as well as combining/discussing research techniques with different research questions. Moreover, as stated by Khankeh et al. (2015) and Kalman (2019), novice researchers are challenged by the inability of selecting relevant methodology and design, identifying the research problem, and developing relevant research questions.

## **Research framework**

### **The nature of research frameworks**

Research frameworks influence all fields of inquiry, even though most researchers do not understand the development of research frameworks. By definition, a framework may be viewed as a combination of rules, principles, standards, ideas, and agreements that describe something that is in the early stages of development. In research, a framework is a structure of ideas relevant to the phenomenon being investigated (Lester, 2005; Sriraman & English, 2010). A research framework drives four benefits into a research or research development process. These include providing the structure for conceptualizing/designing research studies, allowing the researcher to transcend common sense, making sense of the research data, and providing an avenue for a deeper understanding of the research. In the end, the abstractions and relationships outlined in a research framework define the features of the research phenomenon under the investigation (Lester, 2005).

### **Types of research frameworks**

Research frameworks can be classified into three different types based on the work of the educational anthropologist (Ngulube et al., 2015). These three types include conceptual frameworks, theoretical frameworks, and practical frameworks. As described in Jozkowski (2017), conceptual frameworks form the general structure that justifies research or investigation. They outline the things to be considered in a study, and they accommodate the views of both the insiders and the outsiders (Lester, 2005). Overall, the conceptual framework is a reflection of the researcher's understanding of the research problem (phenomenon) and the exploration of the best way to investigate it to find the reality (Ravitch & Riggan, 2016).

On the other hand, theoretical frameworks are theory-based frameworks that guide research activities based on a formal theory (Grant & Osanloo, 2014; Lester, 2005). Since it is impossible to develop theoretical research, then a theoretical framework should always be articulated. However, the researcher should beware of the four setbacks of using theoretical frameworks (Lester, 2005). These include explaining results based on decree rather than evidence, the loss of data context/local meaning, failure of theories in addressing routine practices, and lack of triangulation. Overall, both conceptual frameworks and theoretical frameworks outline the general research approach, guide them on data collection/interpretation/explanation, and outline the study's research variables/concepts (Imenda, 2014).

Moreover, practical frameworks are based on the practicability of research activities. In this case, the research questions in research are based on the knowledge base as well as research results obtained in the research area of interest. However, this type of framework is more detailed in transferable studies and solely depends on the insiders' perspectives (Lester, 2005).

### **Misunderstandings concerning research frameworks**

Generally, some researchers do not understand the role played by research frameworks in research because of the misunderstandings surrounding it. One of the principal problems that cause misunderstandings about the use of research frameworks is the meaning of applying it in research. Another problem is that the lack of qualification concerning the capacity to engage in research frameworks because of the general lack of theoretical training among graduate researchers as well as the general insistence of theory-based explanations of research findings by research journals (Lester, 2005).

### **Prevalent research gaps**

One of the predominant gaps in the literature is novice researchers and graduate students' inability to explain and support their research papers based on philosophical research assumptions, paradigms, and praxis. In a research paper by Kivunja and Kuyini (2017), and Kalman (2019) it was found that higher degree scholars and novice researchers could not elucidate the application of research paradigms in research proposals. As a result, there is a need for research education to encompass some elements of research paradigms in order to facilitate the application of these concepts in research. Kivunja and Kuyini (2017), and Kalman (2019) also suggested the need to train students in these concepts to help them master the skills needed to do better in their academic research outputs- without losing sight of more details about the paradigms on which that research is based. The findings were echoed by Grix (2002), who suggested students need to learn and better understand tools as well as terminologies necessary in the development of research. Bosch (2018) also highlighted the need to put the philosophy back into the doctorate of philosophy: that is, the 'Ph' back into the Ph.D., and she explained that academic institutions had shifted far from using philosophy in curricula and scientific research. Several authors such as Pitcher (2011), Crossan (2003), Mkansi and Acheampong (2012), and Avgousti (2013) have explained that despite the

importance of the relationship between philosophy and practical application, it is not easy for a novice researcher to apprehend it without relying on uncomplicated and straightforward learning resources. In the same context, Efinger, Maldonado, and McArdle (2004) called attention to the need to teach research philosophy in doctoral courses, as the absence of these courses may generate a serious gap that could reflect negatively on scientific production.

Žukauskas et al. (2018) highlighted that expert researcher, unlike students and novice researchers, have advanced insights concerning research methods and can advise the latter in the development of scientific research. Sefotho (2015) and Walliman (2017) elaborated that expert researchers understand the theories, rules, and principles of research, and can also become a source of knowledge and guidance for novice researchers. These researchers suggest that novices need guidance in understanding the importance of each element in the 3Ps and can benefit from learning tools that support their learning from courses or from expert researchers with whom they work.

Both postgraduates and novice researchers have difficulties using philosophy to inform their research while Ph.D. students often complete their research projects without mentioning the word philosophy or paradigms (Kalman, 2019; Kivunja & Kuyini, 2017; Makombe, 2017; Wilkinson, 2005). The vast number of paradigms can make it difficult for novice researchers to orient their thinking and papers, which often creates confusion and blurry boundaries in their research framework (Barbara & Giddings, 2002; Sefotho, 2015). There are dozens of paradigms that may have an influence on research and research practices in both natural science and social science. Creswell and Plano Clark (2018a), Guba and Lincoln (1994), Morgan (2007), Willis (2007), all pointed out that popular paradigms in social science include positivism, postpositivism, interpretivism, and constructivism. Others such as Scott and Usher (2011), Crotty (1998), Merriam (2015), and Patton (2014) add objectivism, subjectivism, positivism, and critical realism, and



interpretivism. There were also mentions of epistemological-related paradigms that are more inquiry-oriented, like empiricism, externalism, constructivism, deconstructionism, pragmatism, rationalism, representationalism, instrumentalism, dualism, skepticism, and historicism (J. Li & Zhu, 2019; Schwandt, 2015). In literature, paradigm appears under different names such as perspectives, worldviews, assumptions, meta-theory, dogmatism/dogma, philosophical doctrine, positions, code of beliefs or form of teachings. In this study, the term "paradigm" will be used to standardize terminology that is commonly used in the research literature. The term "paradigm" is often used interchangeably with other concepts used in the press (Egbert & Sanden, 2013). In the context of the research, some researchers use the term "*paradigm*" as an alternative term of methodology, methods, conceptual or theoretical framework, and in other cases philosophical assumptions (Teddlie & Tashakkori, 2009). However, there is a significant difference between these concepts as explained in detail in the literature review chapter. A paradigm influences the research based on five different components namely explicitly stated laws/theoretical assumptions, standard application of laws in different situations, instrumentation/instrumental techniques used to bring paradigm laws in reality, the guiding metaphysical principles in research work, and methodological conditions of working within a paradigm (Willis, 2007).

The lack of understanding of the research praxes (for example, action research and observational research, amongst others) makes it challenging to maintain necessary empirical standards of research. Failure to understand research praxis can jeopardize the quality of research by influencing the empirical approach negatively, because of the possible likelihood of misusing or misinforming the use of data collection instruments.

Antonenko (2014), Kivunja and Kuyini (2017), and Makombe (2017) stated that the combination of the 3Ps of research is new to many graduate students. Egbert and Sanden (2013)

went further by suggesting that most researchers find a large number of research paradigms and methodologies challenging to comprehend, and as a result, there is a need to explore and elaborate on these paradigms and methodologies. As a result, most postgraduate students still go through the educational system without developing the essential knowledge encompassing the elements of the 3Ps in research, and therefore, novice researchers cannot connect different philosophical foundations to their methodologies (praxis) or research paradigms (Efinger et al., 2004). The levels of the 3Ps vary from one researcher to another, and they are not random, free-floating theoretical devices, but "theoretical maps that help doctoral students plot, anchor and illustrate the paradigmatic, ideological, metatheoretical and methodological perspectives and allegiances of their research" (Durham et al., 2015, p. 3).

According to Kivunja and Kunyini (2017), every research study involves some philosophical assumptions from a researcher's previous experience in a specific realm of knowledge. According to Leavy (2017), philosophical assumptions form the aspect involving authority and schemes behind the application of research findings. The ability to conduct and report on research grounded in philosophical assumptions is especially challenging when the researcher is unaware of the influence's philosophy can have on scholarly work. Baxter and Jack (2008) and Kivunja and Kunyini (2017) also pointed to the general lack of comprehension of the philosophical assumptions that may influence the research process. To develop the research instrument – the 3Ps advance organizer - a theory was identified to provide the guiding principles of designing the advance organizer.

### **Recent applications of 3Ps in research**

Several recent studies have demonstrated the application of 3Ps to a great depth, but others have significant difficulties showing these elements in their papers. In Zimmerman (2019), the author uses transformative paradigm, epistemological critical theory philosophical assumptions, and mixed-method research for praxis but in another study by Ernest (2016), ontological assumption, interpretive/scientific paradigm and case study praxis were used. Moreover, Sangrá, Raffaghelli, & Guitert-Catasús (2019) demonstrates ontology for philosophical assumption and systematic review for praxis, but does not demonstrate the researcher worldview.

However, the application of the 3Ps is the best demonstrated in two papers by McGough (2019) and Whitlow-Spurlock (2019). In McGough (2019), the author appears to incorporate the use of the 3Ps in his research work. The paper uses methodological eclecticism philosophical assumption, pragmatic-constructivist research paradigm and mixed methods praxis for the research. In the paper McGough (2019) added that pragmatism is not tied to one ontology/epistemology and that as a result, it is possible for him as a researcher to draw from both qualitative and quantitative philosophies in order to address the research question. In the same vein, the philosophical assumption (methodological eclecticism) allowed him to adopt paradigm pluralism in order to answer the research question adequately. Moreover, the research praxis assumed the use of mixed methods research where a phenomenological approach guided a five-phase mixed-method research design. The paper is similar to the work of Lovell-Martin (2019), where the author used constructionism paradigm, combined axiology, ontology, and epistemology for philosophical assumptions, and qualitative phenomenological research praxis.

Whitlow-Spurlock (2019) used three philosophical assumptions namely axiology, epistemology and ontology. He defined ontology as the study of reality and the definition of reality, epistemology as the definition of knowledge, and axiology as the question of the function of

research values. Whereas, Whitlow-Spurlock (2019) used a combination of several paradigms in the development of the paper. These include Biblical, pragmatic and constructivist worldviews. In his dissertation, Whitlow-Spurlock (2019) explained his application of constructivist view as the basis that he used to develop a theory from the data without losing focus of the processes of the phenomenon under the investigation. He also described his pragmatic view as his agreement to the concepts of what works in relation to personal choices, freedom of choice and personal needs, but disagreed with the lack of unity/truth due to pragmatic view. Moreover, Whitlow-Spurlock (2019) used Biblical worldview from his faith as it encompassed the two paradigms. Moreover, Whitlow-Spurlock (2019) used the qualitative method as the praxis of the paper in order to examine, explain, explore and understand the phenomenon in order to strengthen empirical knowledge.

Unlike Whitlow-Spurlock (2019), Gatarek (2018) applied the 3Ps by identifying with both the epistemological and ontological philosophical assumptions, and recognized abolitionism, veganism and socialism as his worldviews, but used mixed methods research for praxis. However, Gatarek (2018) still had a major difficulty explaining his choices and observes that he had been pursuing the answer for over thirty years and he believed that the best answer can only be offered by an expert of research philosophy, paradigm and praxis. In Onghena, Maes and Heyvaert (2019), a constructivist/interpretivist paradigm mixed-methods case study was used as the praxis while philosophical assumptions behind the paper remained unrevealed.

Moreover, with particular regard to studies in instructional design and technology, a recent paper where the author demonstrated advanced applications of the 3Ps is the work of Olivier's (2019), titled work: "Short Instructional Videos as Multimodal Open Educational Resources in a Language Classroom." The author employed the interpretivism research paradigm, as the article intended to 'understand the subjective world of human experience,' and through the interpretation

of responses to open-ended questions, the researcher ‘maintained the integrity of the phenomena being investigated.

Another example is the Young Researcher Award is given by the Association of Educational Communication Technology (AECT) to novice researchers who articulate advanced scholarly thinking in early published works. A recent award went to “Explored the Temporal Dimension of Forum Participation in MOOCs” by Tang et al. (2018). This work presented the 3Ps but not fully explicitly, as the authors used pragmatic as a paradigm and educational data mining as the praxis. Based on a pragmatic viewpoint of the paper, the authors looked into the practical aspects of forum participation in MOOCs rather than what might be viewed as the absolute truth. The research process (praxis) involved educational data mining to identify clusters with different trajectories and learners with intrinsic motivation – based on a pragmatic viewpoint and the ontological approach. The paper was based on an ontological philosophical approach to demonstrate the character of forum participation and intrinsic motivation to explore forum participation in MOOCs for temporal dimension. The authors demonstrated the understanding of the philosophical foundations, paradigms, and research processes, which helped them to demonstrate advanced thinking and rationalization.

For a long time research has formed a significant area of curriculum and qualification for both novice researchers and graduate/Ph.D. students to help them transform from mere graduate students to fully qualified researchers. However, regardless of the massive emphasis on the development of research skills among novices, evidence has emerged that suggests new researchers face many challenges in developing their scholarly works. This is primarily due to their insufficiency in incorporating relevant philosophical assumptions in their research and relating these assumptions to their research practices on well-defined research paradigms (Kalman,

2019). In the same vein, most novice researchers have difficulties applying the related concepts of research methods, thus making it difficult for them to produce relevant research works (Kivunja & Kuyini, 2017; Makombe, 2017). The generalized challenges of novice researchers and graduate scholars in developing research projects bring up a need for the instructors to develop means of delivering the knowledge of the 3Ps to new researchers to help them hone their research skills and become capable of developing relevant research works.

This literature review covers theories necessary and applicable to the development of a 3Ps advance organizer. The resulting advance organizer's goal is to enhance instruction for novice researchers helping them develop an understanding of the 3Ps that influence research practices and research paradigms and praxis and the ability to apply the 3Ps in their scholarly activities and writing.

Overall, this literature review considers multiple sources to develop an argument for the need of more training in philosophical research assumptions, paradigms, and praxis, and for describing theories that apply in the development of professional and comprehensible instructional materials.

Locating relevant sources for this topic was an exhausting endeavor requiring visits to multiple libraries and exploration of databases. There are literally thousands of articles, books, papers, presentations, and other resources in the body of literature that reports on the practices of scholarly research. Some address philosophies of research; some address scientific paradigms; and some address praxis or methodological. Much of this literature is in the form of general references meant to describe social and scientific research.

### **Overview of relevant theories: The theory behind the advance organizer**

Cognitive theory of multimedia learning provides a valid set of principles that describe how to create effective visuals for learning (R. E. Mayer, 2009). This theory does not explain the elements of the content used in a visual representation; it provides the principles to guide the design of an advance organizer. The principles of multimedia learning were used to design an advance organizer of the 3Ps as a multimedia learning tool for novice researchers, especially graduate students. These principles guided the design of a learning tool that is most likely to support novices and students learning about the 3Ps. This theory explains how multimedia instruction can influence learners' understanding of concepts.

According to the visual argument perspective in the cognitive theory of multimedia learning, advance organizers (visual representations) can be processed during learning more efficiently than text, which allows them to support cognition (cognitive development) in complex domains (Vekiri, 2002). The advance organizers function as memory support, enabling learners to have access to information without maintaining it in working memory, guide cognitive activity, and facilitate inferencing during problem-solving (Tergan & Keller, 2005). According to Schwaborn et al. (2011), the cognitive abilities of students are overwhelmed by new ideas, information, and methods, and as a result, they cannot process new information efficiently. This theory presents a scientific basis for designing learning materials that can present information a pace as well as a level of complexity that a learner can understand concepts fully (Kirschner et al., 2011). Subsumption theory, was developed by David Ausubel to explain the instructional design behind learning materials and help with the creation of instructional materials to engage learners in organizing content and making it meaningful for transfer (Ausubel, 1978; Pappas, 2014). Overall, the following section offers an extensive overview and review of the cognitive theory of multimedia learning developed by Richard Mayer (Issa et al., 2011; R. E. Mayer, 2009, 2014c),

along with the two accessory theories considered to be the basis for Mayer's theory: Cognitive Load Theory developed by John Sweller in the late 1980s (Schweppe & Rummer, 2014; Sweller, 1988, 1999; Sweller et al., 2011); and Subsumption Learning Theory developed in 1963 by David Ausubel (Ausubel, 2000; Biser, 1984; Ivie, 1998). Figure 1 illustrates the cognitive load theory and its relationship to the cognitive theory of multimedia learning.

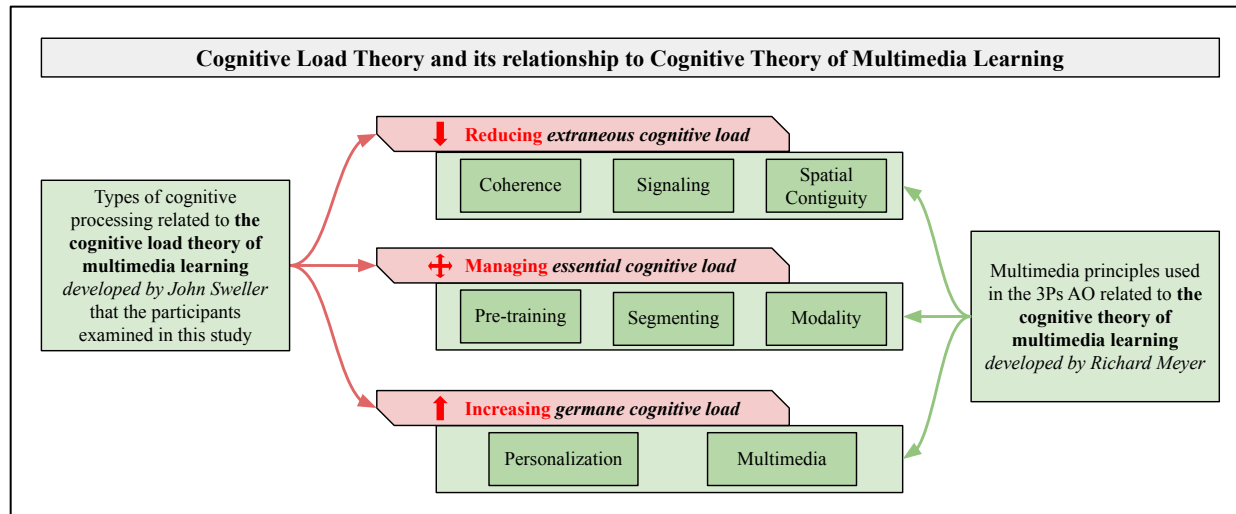


Figure 1. the Cognitive Load Theory and its relationship to Cognitive Theory of Multimedia Learning

Mayer's Cognitive Theory of Multimedia Learning and The Cognitive Load Theory of Multimedia Learning by Sweller will provide the theoretical background for developing the 3Ps advance organizer. Multimedia entails the employment of different presentational tools/techniques, such as images, shapes, videos, audio, posters, etc., in delivering specific info. Often, instructors/instructional designers use multimedia tools to convey important info to the learners (Ramlatchan, 2019). In order to develop effective learning media, Mayer's multimedia learning theory provides a rich set of principles for designing effective instructional multimedia. The theory is the product of combined contributions of various scholars who proposed models, frameworks and theories that influenced the development of Mayer's work. The principal contributions include ideas derived from Paivio's dual coding theory, Sweller's cognitive load



theory, and Baddeley's working memory model (Ramlatchan, 2019). It should be noted here that the 3Ps advance organizer proposed in this study is a static learning tool, which means that multimedia design principles related to the static document were used, and other principles related to dynamic media features were excluded. Table 3 illustrates Mayer's 12 principles of multimedia learning, and principles applied to the advance organizer of the 3Ps, including coherence, signaling, spatial contiguity, pre-training, modality, multimedia, segmenting, and personalization; the principles of redundancy, temporal contiguity, voice, and image were excluded due to the static nature of the advance organizer.

Table 3. Mayer's 12 Principles of Multimedia Learning

Purpose	Design Principle	Brief description of the principles (R. E. Mayer, 2009)	Status
Reduce extraneous processing	Coherence	People learn more deeply when exotic words, pictures or sounds are excluded rather than included	Applied
	Signaling	People learn more deeply when adding signs that highlight key ideas and word organization.	Applied
	Redundancy	People learn more deeply from animation and narration than from animation, narration, and on-screen text	Not applied
	Spatial Contiguity	People learn more deeply when corresponding words and images are presented close together on a page or screen	Applied
	Temporal Contiguity	People learn more deeply when corresponding words and images are presented simultaneously rather than consecutively	Not applied
Manage essential processing	Segmenting	People learn more deeply when large segments are broken down into smaller, manageable chunks	Applied
	Pre-training	People learn more deeply when they have a forehand knowledge of the names as well as the characteristics of the primary concepts	Applied
	Modality	People learn more deeply from narrations and graphics than on-screen text and animation	Applied
Increase germane processing	Multimedia	People learn more deeply when the learning tool comprises of words and pictures instead of just words	Applied
	Personalization	People learn more deeply when the learning tool contains words in conversational style instead of the formal style	Applied
	Voice	People learn more deeply when a friendly human voice instead of a machine voice is used in the narration in multimedia narration	Not applied
	Image	People learn better when images are non-abstract, and clearly represent the content being presented	Not applied

### **Cognitive theory of multimedia learning (Mayer)**

**Mayer's 12 principles of multimedia learning.** Figure 2 illustrates cognitive theory of multimedia learning by Mayer (2009) that is based on three basic ideas about the human mind: dual channels, limited capacity, and active processing. When developing a presentation presenting static visual educational content (for example, printed texts and graphics) or dynamic (such as animation and spoken narration), it is difficult to experience face-to-face interactions with learners. As a result, Mayer's 12 principles of multimedia learning provide insights into ways that an instructor may increase the engagement of the audience without necessarily engaging in face-to-face interactions (Mayer, 2014). Visual presentation should involve a balanced use of the 12 principles of multimedia learning to be effective and efficient at delivering content to an audience. Mayer (2009) suggested that the cognitive theory of multimedia learning is a learner-focused paradigm with cognitive-constructivist orientations or assumptions, that applies to many educational practices. This media theory focuses on the use of the most effective methods of instruction to support complex learning. Therefore, this theory guides the designer in combining visual and auditory cues into an effective tool for learning and instruction. The principle, known as the "multimedia principle," states that "people learn more deeply from words and pictures than from words alone" (R. E. Mayer, 2009, p. 47).

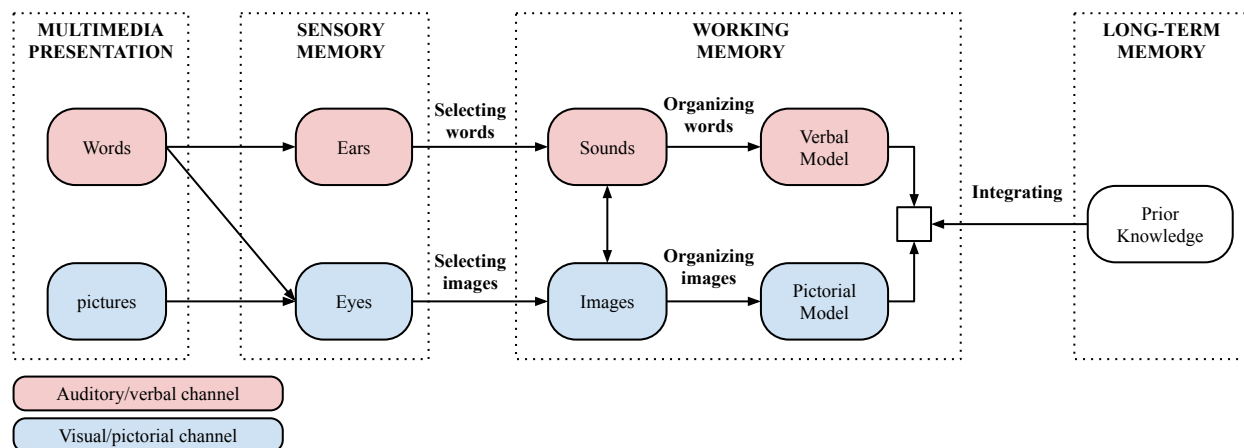


Figure 2. cognitive theory of multimedia learning by Mayer (2009)

Indeed, when it comes to learning with multimedia, this theory introduces three main premises: there are two separate channels (visual and auditory) for processing information; each channel has a limited capacity; and learning is an ongoing process of filtering, selecting, organizing, and integrating information based upon prior knowledge (Mayer, 2014). From this theory, a list of twelve principles of multimedia learning was proposed as shown in Table 3, these principles include coherence, redundancy, signalling, temporal contiguity, segmenting, voice, personalization, multimedia, pre-training, modality, and image principles (R. E. Mayer, 2009). It is important to note that some of the twelve principles presented by Mayer (2014) will not be applied in the proposed advance organizer of the 3Ps because the principles related to the auditory channel will be excluded.

The first principle is coherence, and it holds that people can learn better when there is an exclusion rather than the inclusion of extraneous words, sounds and pictures (Mayer, 2014). This is because of the limited capacity factor in cognitive learning, as explained in Groshans et al. (2019). On the other hand, the signalling principle states that learning happens better when the organization of the essential material is highlighted through thoughtful cues. In contrast, the redundancy principle observes that learning happens better when people are exposed to graphics

and narration rather than graphics, narration, as well as on-screen text (R. E. Mayer, 2014c). This is why Colombo and Antonietti (2013) vouched for the role of illustrations in facilitating learning, especially among primary school children. According to Leach (2012), the redundancy principle needs to be considered when efficient learning is a requirement with multimedia instruction material. The spatial contiguity principle states that learning happens better when corresponding pictures and words are presented close to each other rather than far apart on the page, while the temporal contiguity principle observes that learning happens better when there is a simultaneous presentation of pictures and corresponding words instead of a successive presentation of words and pictures (R. E. Mayer, 2014c). These principles, according to Shoufan (2019) and Li et al. (2013), too, have a significant role in the development of educational videos for use in mathematics instruction.

The sixth principle, segmenting principle, states that learning happens better when content is presented using user-paced segments instead of continuous units (R. E. Mayer, 2014c) - a definition that is shared by Hong et al. (2014) and Lock (2009). The pre-training principle observes that learning happens better when the audience has a forehand knowledge of the names as well as the characteristics of the primary concepts, while the modality principle holds that learning happens better from narrations and graphics than on-screen text and animation (R. E. Mayer, 2014c). The multimedia principle observes that learning happens better when the learning tool comprises of words and pictures instead of just words. Based on the work conducted by Hong et al. (2014) and Lock (2009) segmentation may be achieved through temporal segmentation and synchronous segmentation, while according to Mayer (2014), pre-training, modality and multimedia principles help in deepening a learner's comprehension of main characteristics of the primary concepts of a presentation. The tenth principle is the personalization principle, which

observes that learning happens better when the learning tool contains words in conversational style instead of the formal style (Mayer, 2014). Moreover, the voice principle observes that learning happens better when a friendly human voice instead of a machine voice is used in the narration in multimedia narration. The twelfth principle is the image principle, and it states that adding the presenter's image does not necessarily improve people's ability to learn from a multimedia learning tool (R. E. Mayer, 2014c). In support of the use of Mayer's multimedia learning principles, Van Bramer (2003) observes the conversational, voice and image principles of the theory increase instructional interaction, especially in an educational setup.

Overall, the application of these principles has been found to increase and sustain short-term retention among students, although there is still a significant need to explore how they influence the transfer of learning (Issa et al., 2011). The principles can also be applied in teaching complex disciplines and creating virtual classrooms (Nagmoti, 2017). The cognitive theory of multimedia learning is divided into three processes: extraneous, essential, and generative. Three instructional design goals encompass these processes. The purposes are to reduce extraneous processing, manage essential processing, and increase germane processing.

***Reduce Extraneous Processing.*** Park (2015) observed that the presence of pedagogical agents in presentations produced unnecessary cognitive load and cognitive load should be kept at the minimum for learning to happen effectively. So, reducing extraneous processing is aimed at preventing cognitive overload among learners by concentrating on the relevant content and avoiding the one that might distract the learners (S. Park, 2015). In order to reduce extraneous processing, instructional designer needs to pay attention to the first five principles of cognitive multimedia learning theory (R. E. Mayer, 2014a; N. Williams, 2018) namely coherence principle, signaling principle, redundancy principle, the spatial contiguity principle, and the temporal

contiguity. However, according to Hawthorne et al. (2019) cognitive load may also be reduced by increasing the temporal contiguity principle, which is observed by allowing relevant graphics to appear concurrently with audio, while the other principle is the spatial contiguity, which is observed by keeping labels close to the relevant images (R. E. Mayer, 2014a; N. Williams, 2018). According to Sorden (2005) these principles must be considered early in the instructional design for multimedia learning. (Nagmoti, 2017). The third principle of multimedia learning theory is redundancy principle, which is observed by keeping the details in the audio without including the text paragraphs on the screen (R. E. Mayer, 2014a; N. Williams, 2018). As observed by Liu, Jang and Roy-Campbell (2018), the three modes namely audio, graphics, and text must have a specific balance in order to demonstrate the capacity to reduce extraneous load effectively. The fourth principle that is involved in the reduction of extraneous processing is the signaling principle, which helps by promoting the use of appropriate graphics as a way of highlighting the main ideas of the content. The fifth principle is the coherence principles, observed by avoiding content that can overload learners and focusing only on the learners' needs without distracting them with irrelevant media or text (R. E. Mayer, 2014a; N. Williams, 2018). Overall, according to Mayer (2014c), reducing extraneous processing is necessary for ensuring that learning materials meet a specific level of the learner's cognitive capacity.

***Manage essential processing.*** Managing essential processing pertains to the ability of the learner to comprehend points of a presentation - it pertains to content that learners can process during the learning period, based on their abilities (R. E. Mayer, 2014a; N. Williams, 2018). According to Mayer and Pligard (2014), managing essential processing is about avoiding essential overload (cognitive overload). For instructors to manage essential processing adequately, they have to consider three different principles of cognitive multimedia learning theory, namely the

segmenting principle, pre-training principle, and modality principle (R. E. Mayer, 2014a; N. Williams, 2018).

The segmenting principle is achieved by keeping animations short, while the pre-training principle is achieved by explaining key concepts, ideas and terms before the actual presentation. The modality principle is achieved by increasing the amount of animations in a presentation compared to graphics and texts (R. E. Mayer, 2014a; N. Williams, 2018) while carefully ensuring that modality is employed in situations not involving low-experienced content users (Oberfoell and Correia, 2016).

***Increase germane processing.*** The primary aim of generative processing is to allow the learner to comprehend and make sense of information being acquired from learning materials (R. E. Mayer, 2010). The cognitive multimedia learning theory has two principles to foster generative processing (R. E. Mayer, 2014a; N. Williams, 2018). Fostering generative processing is especially enhanced by adding challenging scenarios and appealing graphics in learning material (Mayer, 2014). The principles include the personalization principle and the voice principle, where the former is achieved by keeping the learning material conversational while the latter is accomplished through the use of actors rather than machines (R. E. Mayer, 2014a; N. Williams, 2018). These principles are generally referred to as social cue principles in Park (2015). By applying the principles of cognitive multimedia learning theory correctly, it is possible to develop presentations that can deliver complex information to learners without compromising their ability to grasp, comprehend and retain information details during the process of learning (R. E. Mayer et al., 2014a; N. Williams, 2018). According to Kirschner, Park, Malone and Jarodzka (2016), applying the cognitive multimedia learning theory in the development of learning materials means increasing some forms of the extraneous load while minimizing the germane load.



## Cognitive load theory of multimedia learning (Sweller) in relation to Mayer's cognitive theory of multimedia learning

The working memory helps with the processing of the learning information, and as a result, the cognitive load presented to the working memory can be categorized based on its function (Sweller, 1988, 1999). The cognitive capacity of any individual is subject to change through instruction and presentation to new information in well-premeditated learning materials. In this case, the most important of such categories are extraneous cognitive load, germane cognitive load, and intrinsic cognitive load (Sweller, 1988, 1999); as summarized in Table 4. According to Molina, Navarro, Ortega and Lacruz (2018), every learning material presents a certain level of cognitive load.

*Table 4. Three Kinds of Cognitive Processing Associated with the Purpose of Mayer's Principles of Multimedia Learning*

Cognitive Processing	Purpose	Description (Spector et al., 2014)
Extraneous	Reduce extraneous processing	Not related to the instructional goal, caused by poor learning design.
Essential	Manage essential processing	Aimed at representing essential material, caused by complexity of material.
Germane	Increase germane processing	Aimed at making sense of essential material, caused by learner's effort.

**Extraneous cognitive load.** This is the working memory load that learners experience in their interaction with the instructional materials, which described by Park (2015) as the impact of the ineffective instructional design that influences the learner's long-term transfer as well as long-term retention (Issa et al., 2013). It corresponds to the reduction of extraneous processing in Mayer's theory. This load emerges from the way an instructor presents information to the

audience, for example giving irrelevant pieces of information to the audience inhibits their ability to comprehend the important bits of information in the presentation (Sweller, 1988, 1999).

**Essential cognitive load.** Intrinsic cognitive load refers to the inherent difficulty associated with the processing of content, which according to Park (2015) is the load imposed due to the intrinsic characteristics of content, information or task being presented to the learner. Intrinsic cognitive load results from the interactive elements of different aspects of information that need to be delivered and processed concurrently in order to accomplish a specific objective (Sweller, 1988, 1999). Intrinsic cognitive load is inherently linked to the subject matter's difficulty, and therefore the level of the cognitive load cannot be readjusted using instructional design. Sweller (1988, 1999) is supported by Gerven, Paas and Tabbers (2006) in a claim that associates cognitive load theory to the need to reduce the load imposed on working memory as a way of improving the full functioning of the working memory. For example, the instructional designers should focus on the information learners needed, avoid distracting them with non-essential text or media, and use the appropriate graphics to highlight the main ideas.

**Germane cognitive load.** Germane cognitive load is the constructive cognitive load that involves the effort involved in constructing the long-standing store of knowledge and schema. Germane cognitive load corresponds to fostering generative processing in Mayer's theory. Germane load has been described elsewhere as "generative cognitive processing" (R. E. Mayer, 2014c). This type of cognitive load increases the pace of the learning process and maybe exemplified in the creation of flowcharts to explain the technically complex concepts or ideas (Sweller, 1988, 1999). As a result, processing involves the development of patterns concerning behavior or thoughts to categorize information to reduce the energy and time used in assuming

specific behaviors. Germane cognitive load can be promoted by the use of mnemonics, rhyme schemes, and acrostics, amongst others, to facilitate learning (Sweller, 1988, 1999).

### **Map-shock and cognitive load theory**

In most instructional situations, the use of concept maps as training tools is a widespread practice because of their inherent capabilities of promoting conceptual understanding of ideas. Hu and Wu (2012) suggested that concept maps increase the students' capacity to understand and seek clarifications concerning various concepts. However, one of the primary concerns with the use of concept maps in training is that when such maps become too complicated, map shock occurs (Moore, 2013). Map shock is the phenomenon that results from the cognitive overload and thus nullifying the positive impacts of concept maps in the process of learning (Moore, 2013). According to Kiefer et al. (2016) cognitive overload impede the ability to solve tasks. This suggests a link between cognitive load theory and map shock, where the problem presented when learners are exposed to large-scale maps. It becomes difficult for them to process the complex content and as a result cognitive overload occurs from the intricacy and density of the information processing, and they disengage to avoid facing the complexity (Moore, 2013). Some of the benefits of concept maps as observed by Freeman and Jessup (2004) included the easy to use, assisting with communication and ease of comprehension. However, as Moore (2013) stated, concept maps are beneficial to learning especially in small-scale utilization, but such benefits become rapidly eroded as soon as such maps are scaled up as the full content of a course due to the map shock (Freeman & Jessup, 2004).

Nonetheless, it is possible to address map shock especially by the use of two approaches to present large pieces of information, namely animated maps and stacked maps (Moore, 2013). Mayer and Moreno (2013) presented nine different approaches to reduce map shock, under two

assumptions namely dual-channel assumption and active-processing assumption. From Moore (2013), animated maps include the combined use of maps and audio narration to guide the learner through complex maps to avoid map shock. Although this approach does impose linearity, as the learner cannot navigate the map freely or search for specific details in the map. Stacked maps however are a simplified solution that breaks the map's content into smaller maps and embed them into the larger map or present a series of maps in a sequential format (Moore, 2013). For this method to be effective at reducing or preventing map shocks, the learner should have the ability to integrate diverse visual data into one holistic piece of information (Moore, 2013). Figure 3 shows a visual representation that lacks employment in multimedia principles (Afamasaga-Fuata'I, 2009).

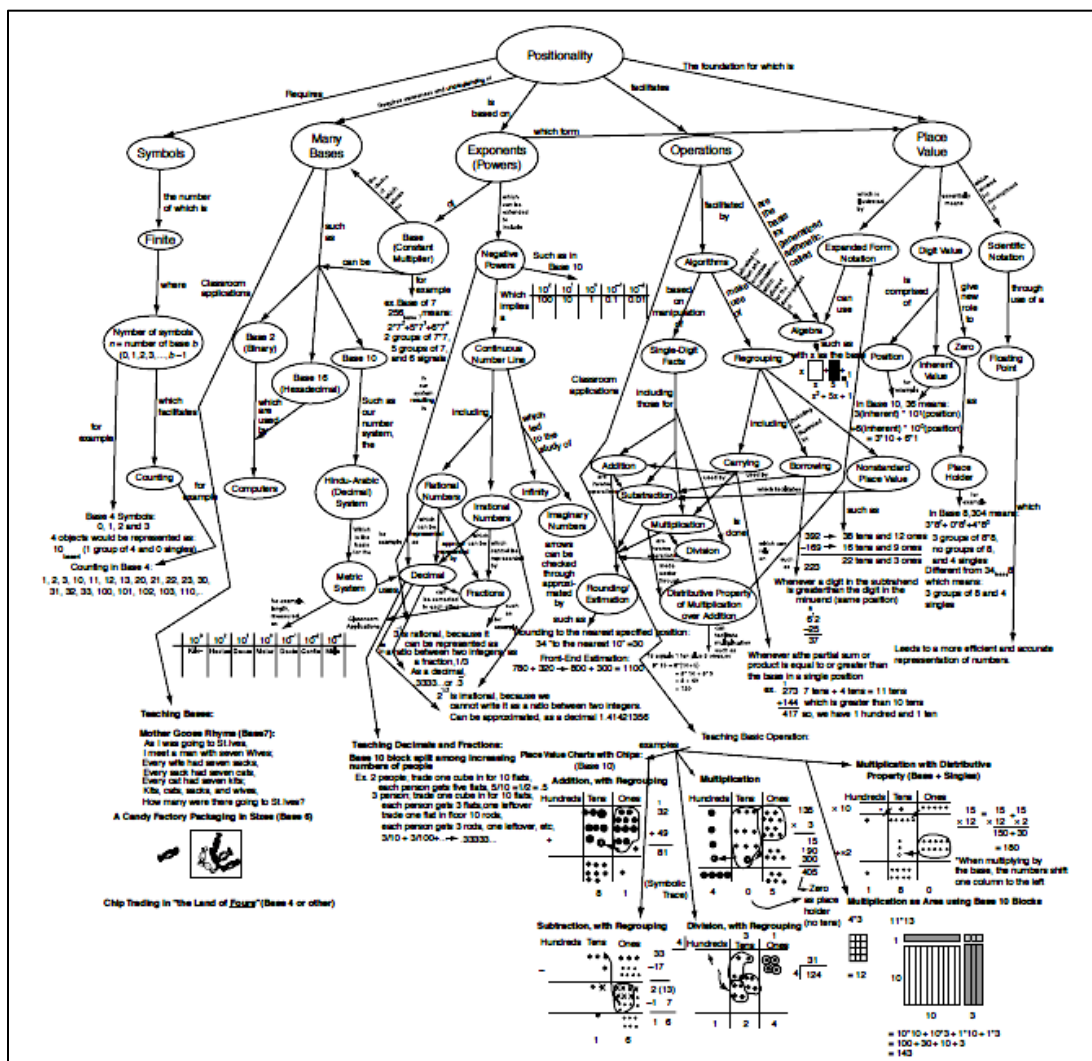


Figure 3. an example of a visual representation that lacks the use of multimedia design principles

Map shock may be explained based on the cognitive load theory, and as highlighted in the previous section, the cognitive theory explains information processing due to the dual-storage model of human info processing (Moore, 2013). As explained in Carley et al. (2018), map shock happens when the cognitive load goes beyond the cognitive capacity. According to Moore (2013), the dual store model of human cognitive processing comprises three information storages, namely long-term memory, working memory as well as the sensory register. Long-term memory is interested in the storage of knowledge scheduled for later processing, and thus such information is processed for later recalls. On the other hand, working memory is the one that holds the ongoing

thoughts from the sensory register and one that is stored within long-term memory (Moore, 2013), and it is the responsible for the processing of cognitive tasks (Cowan, 2009). Besides, the sensory register is tasked with the recording of information freshly processed from the senses (Moore, 2013); such information that is targeted by the sensory register is referred to as the sensory information (Cowan, 2009). The sensory register has a small memory span. According to the cognitive load theory, the working memory plays the most significant role in learning architecture (Moore, 2013; Redifer et al., 2019). The theory also explains further that working memory has a limited capacity for information storage, which is variably exhibited in different people, and thus limiting people's ability to handle large volumes of information per unit time (Moore, 2013); although these shortcomings can be resolved through several strategies based on their capacities to reduce the load imposed on the individual's working memory systems (Schweppe & Rummer, 2014). In this case, a learner should not be presented with more information than what their working memory can handle because failure to heed this results in cognitive overload and limitation to learning (Redifer et al., 2019). In the same observation, learners should be presented with the optimal volume of information for their learning to be promoted because failure to give adequate information for processing by the working memory makes the learner disinterested, which again limits learning (Moore, 2013). In the same case, according to Chen et al. (2018), care should be taken to avoid the depletion of the limited resources existing in the working memory in order to maintain the optimal cognitive performance of the working memory. From this description, it is possible to view cognitive overload as an incarnation of map-shock because the latter develops from the inability to process concept maps completely – the net effect of cognitive overload (Redifer et al., 2019).

### **Advance organizers (AO)**

Advance organizers are tools used in the learning setups to help teachers in the presentation of information to the students and encourage the audience to comprehend difficult concepts (Ausubel, 1978; Pappas, 2014). According to McManus (2000), advance organizers are tools that instructors use to connect new content information to learner prior knowledge. Advance organizers help facilitate meaningful learning by mentally assisting students in gaining new knowledge, retaining knowledge already learned, and integrating the information into their knowledge structures (Ausubel, 1978; Ciechanowska, 2018; Pappas, 2014). This occurs because well-designed advance organizers help learners organize general concepts in a way that introduces content in a concise fashion (Cutrer et al., 2011). According to Story (1998), organizers provide a link between the new knowledge to be learned and the cognitive structure of the learner in order to help in establishing where new information fits relative to the general information associated with the material or what learners already know. Further, advance organizers are defined by Ruangruchira (1992) as instructional procedures that are used prior to learning activities in order to organize and anchor concepts and facilitate learning. In this case, the complex sets of ideas are presented to the learner in advance of the material to be learned later.

Searls (1983) identified a set of characteristics of the advance organizer, and these were taken into account in developing the advance organizer in this study. One of these characteristics is that advance organizers must be more abstract, inclusive, and general, compared to the target learning materials. Another characteristic is that advance organizers should consider all relevant prevailing ideas in the minds of the learners about the material being learned while the third characteristic is that advance organizer should derive a relationship between the learners' existing ideas and ideas being targeted in the teaching material. The fourth characteristic is that when learners have little ideas about the target topic, the advance organizer should be expository, but

when the new content is related to the learner's cognitive structure, they should be comparative (Searls, 1983). The advance organizer appears in several patterns, as an infographic (Carney, 1992; Dunlap & Lowenthal, 2016; Lidwell et al., 2010); a concept map (Cutrer et al., 2011); a graphic presentation or table (Clark & Mayer, 2016a; Eastman, 1977; Griffin & Tulbert, 1995); a slide-verbal presentation (Proger et al., 1970); a 200-500 word prose passage (Ausubel, 1960, 1978, 2000); a single sentence (Christie & Schumacher, 1976; Goldman, 1976); an audio presentation (Morrell et al., 1974); an "organizer" lesson (Lawton & Wanska, 1979); a "thematic" organizer in the form of a picture, one-word topic, or a title (Farr, 1975; Ozaki, 2000); a method such as SQRRR, SQ3R, or DRA (Deitsch, 1985; Majidi & Aydinlu, 2016); an empty matrix with the horizontal and vertical axes specified (R. E. Mayer, 1979b); a concrete model (Davidson, 1997; LeeSing & Miles, 1999; Mayer, 1979).

Mayer (1979) clarified that the role of the advance organizer makes new subject matter (content) familiar and also organizes existing knowledge in a way that makes assimilating new subject matter with existing knowledge easier and more effective. Concerning the use of the advance organizer as a learning tool in higher education, the literature has emphasized the importance of the advance organizer is in helping learners achieve learning goals in complex subjects (Bullard, 2018; Huifen & Tsuiping, 2007; Jia, 2007; Kiewra et al., 1996; Y.-H. Liu, 2006). In a study conducted by Spector and Koszalka (2004a) called *"Enhanced Evaluation of Learning in Complex Domains (DEEP)"* they demonstrated the feasibility of using annotated visual representations to assess learning progress in complex domains. Interpreted visual representation were used to gather problem conceptualizations from novices and experts in complex domains (e.g., medical, engineering). The basic concept of Spector and Koszalka's (2004a) study was to emphasize that experts (those with extensive experience in a field and strong academic



backgrounds) would demonstrate clearly recognizable patterns in their knowledge visualizations. Experts in a specific domain, e.g., medicine, conceptualize the same problem in similar ways and can visually represent their thinking. Novices however conceptualize the same problem differently from each other and from experts. These visualizations provide evidence of expert and novice thinking patterns (Spector & Koszalka, 2004b).

The advance organizer also showed a significant impact on learners' performance, particularly in e-learning environments (B. Chen, 2007; Chen, Baiyun; Hirumi, Atsusi; Zhang, 2007; Korur et al., 2016). However, the advance organizer needs to incorporate a design that can deliver the content simply and understandably (Story, 1998). The use of advance organizers in the education context has been justified in several studies and in a dissertation written by Bullard (2018) where he explored the effects of the use of interactive geometry software applications as advance organizers. He observed that learners without prior knowledge of a topic being taught in a class tended to demonstrate cognitive overload because their working memory was over-taxed. In the same dissertation, Bullard (2018) argued that learners with rich prior knowledge of the topic found it simpler to absorb content with ease because they did not experience cognitive overload. This finding suggested that by exposing learners to the proposed learning material prior to the actual training or teaching, it was possible for them to achieve better academic achievement. This supports the use of advance organizers to support learning specific concepts. Further Ozaki (2000) pointed out that advance organizers can be used to increase students' listening comprehension of foreign languages, improve consistency of learners listening proficiency, and improve the capacities of the learners' ability to recall information.

### **Origin of advance organizers - David Ausubel's theory of advance organizers.**

The term advance organizer traces its origin to the work of David Ausubel and particularly the theory of subsumption. Subsumption theory was initially developed to explain an instructional design approach that guided the creation of instructional materials to help learners organize content and make it meaningful for transfer (Ausubel, 1978; Pappas, 2014). According to Biser (1984), this theory explains that learning, as well as the retention of new materials, is dependent on the existing cognitive structure of an individual. The goal of the theory is to provide learners with the background information to help them solve problems and retain knowledge gained in the process. Therefore subsumption theory suggests that knowledge acquisition depends on the actual processes of learning where new content is related to relative concepts already existing in the person's cognitive structure (Ausubel, 2000; Ciechanowska, 2018). The theory assumes that an individual's cognitive structure has a hierarchical organization (Biser, 1984). Based on this theory, the cognitive structure is described as the remnants of information that exists in the brain after different learning experiences and the subsequent loss of it through forgetting (Ausubel, 1978; Pappas, 2014).

Subsumption theory may be categorized into two forms, namely correlative subsumption and derivative subsumption (Pappas, 2014) – both of which emphasize that practical learning is specific and systematic (Ciechanowska, 2018). Correlative subsumption may be explained as the phenomenon where new content extends the information that one already holds about a concept or idea (Ausubel, 1978; Pappas, 2014). According to Johnson (1980), Lvie (1998), and Pappas (2014), correlative subsumption involves an advanced level of thinking because the learner gains new knowledge. An example of correlative subsumption theory is when learners already know how gasoline-engines work before starting a learning process of other ways of powering engines

(McManus, 2000). On the other hand, derivative subsumption is explained as the new content derived from an existing structure. According to Lvie (1998) and Pappas (2014), a learner becomes subsumed to facts that they already know. As a result, such material may be linked to different concepts and produce new interpretations (Ausubel, 1978; Pappas, 2014). Subsumption learning theory is based on four different principles, as explained by Ausubel (1978) and Pappas (2014). These principles help teachers develop effective instructional materials and allow learners to achieve optimal outcomes (Biser, 1984). One principle is that the most general concepts should be presented to learners before analysis of content is encouraged (Ausubel, 1978; Pappas, 2014). The second principle is that instructional content should comprise of both the new and the previously acquired knowledge in order to encourage comparison of the new and old concepts (Ausubel, 1978; Pappas, 2014). The third principle states that the existing cognitive structures should be reorganized in the memory of the learner rather than being developed. The fourth principle observes that the instructor has the role of bridging the gap between the existing knowledge and what is in the knowledge acquisition plan (Ausubel, 1978; Pappas, 2014).

**Types and uses of different advance organizers.** Advance organizers help with the preparation of the learners' cognitive structure by introducing schemas as well as conceptual patterns in order to facilitate the seamless subsumption of new information into the existing cognitive structures (Ausubel, 1978; Pappas, 2014). The assumption behind the use of advance organizers is that when instructors give a preview of the content of a learning course, learners start getting the big picture for them to be able to connect the content to theories, new ideas as well as concepts of the mental picture of that field (Ausubel, 1978; Pappas, 2014), and therefore, advance organizers support the process of effective instruction and learning (Cutrer et al., 2011).

It is worth noting that at the level of textbooks or published articles you may notice visual representations that are difficult to understand and don't know where to start or ends, and the reader may feel unwilling to continue looking at the design because of its complexity (Duke et al., 2015). Figure 4, presented by Sisson and Ryan (2017, p. 39), was a visualization introduced as a model of input to knowledge management; however from some readers' point of view in ResearchGat.net (2017) many commented that it is a complex representation and difficult to understand at first sight.

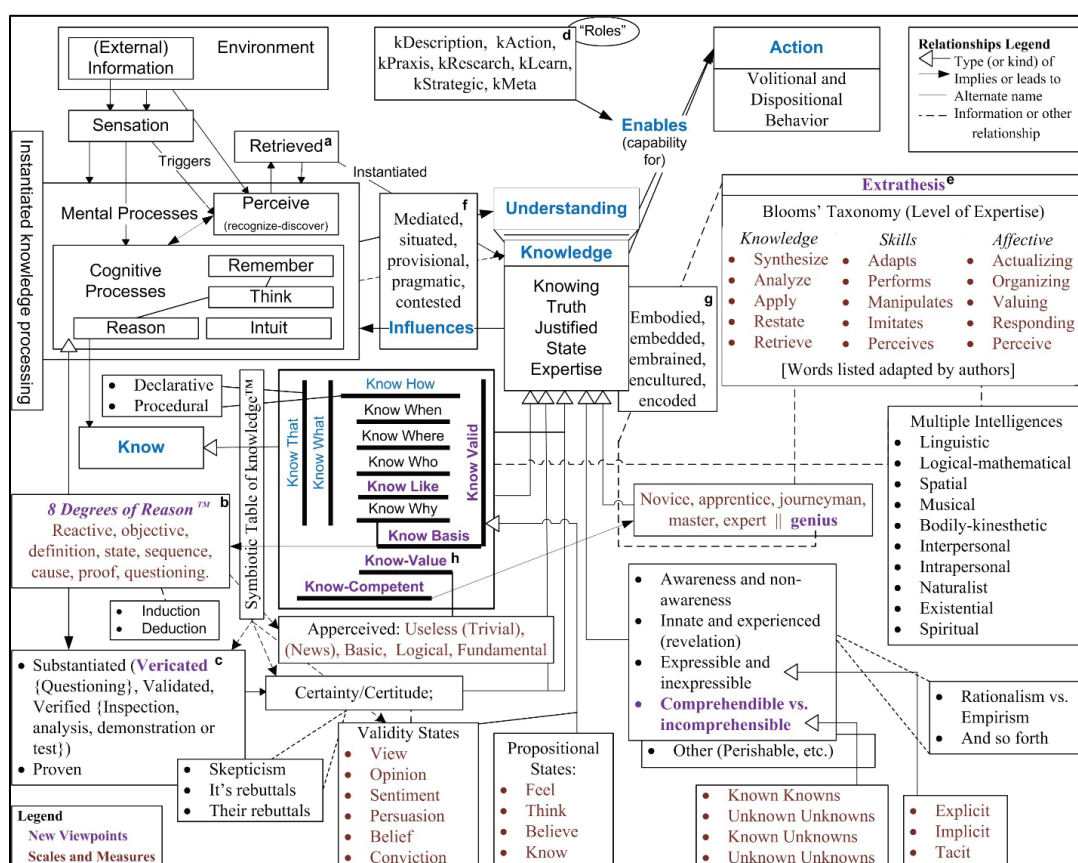
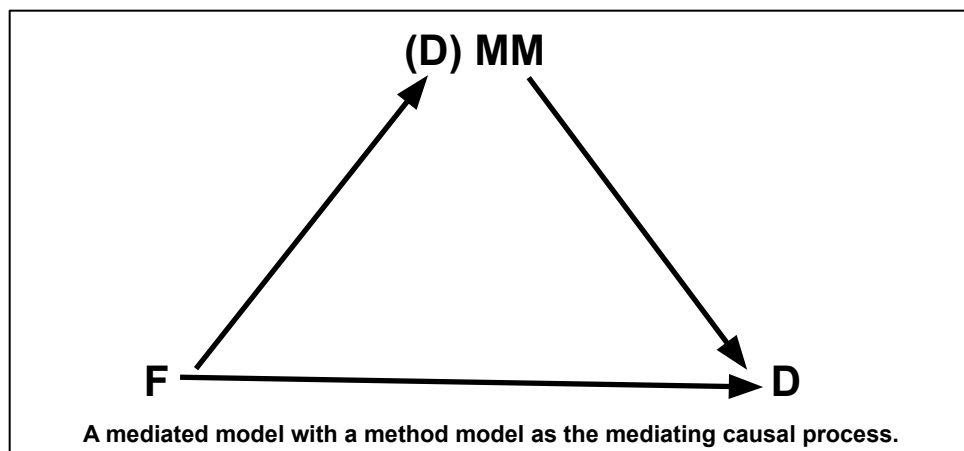


Figure 4. an example of a complex representation

On the other hand, Hertel (2018) argued that simplicity in illustrations can sometimes be negative as well, since the simplicity in design may contribute to its loss of meaning. Figure 5. an example of a lacking meaning representation presented by Steiger and Steiger (2009, p. 12).



*Figure 5. an example of a lacking meaning representation*

Based on Ausubel's theory of subsumption, there are six types of advance organizers that include narrative organizers, expository organizers, skimming organizers as well as graphic organizers (Ausubel, 1978; Pappas, 2014). All of these categories share a common definition that they are introductory materials presented at higher levels of abstraction, inclusiveness, and generality compared to the learning passage itself.

As a characteristic, all types of advance organizers differ from overviews due to their relatability to the presumed ideational content existing in the learner's cognitive structure (Ausubel, 1978). Narrative organizers are designed to give new material in a story format while expository organizers use descriptive formats to present new knowledge, but skimming organizers present information by flicking through the info (Becker, 2016). According to Hill and Miller (2013), narrative advance organizers are used when present concepts to learners who have prior information about them, while expository advance organizers are used to introduce new completely new information or concepts to the learners who have never been exposed to any such ideas. However, skimming advance organizers are used to presenting skimming information before reading a specific text (Marzano et al., 2001). Moreover, graphic organizers utilize descriptions, pictographs, as well as conceptual patterns or concepts, maps to present new information (Ausubel,

1978; Pappas, 2014) – graphic organizers help with bringing the connection between words and phrases (Marzano et al., 2001). Other types of advance organizers, according to Banikowski and Mehring (1999), Gregory and Kuzmich (2017), include KWL charts and analogies. KWL advance organizers are used before lessons begin where students divide a page into three columns represented by lists of what they Know (K), what they Want (W) to know about a phenomenon, and what they have Learned (L) after the lesson. Then again, analogies are advance organizers interested in comparing two things to derive their similarities in order to create familiarity with the topic/subject being discussed (Banikowski & Mehring, 1999; Gregory & Kuzmich, 2017). As an extension for all the six categories of advance organizers, specific learning objectives should be used as the basis for the creation of advance organizers in order to increase their value of improving learner's achievement (Gurlitt et al., 2012; Hatch, 1998).

### **Theory conclusion**

In brief, Meyer's cognitive theory of multimedia learning is designed to describe processes that happen in the learners' minds whenever they are exposed to multimedia instruction. As a result, the theory projects the implications that instructional design has on the learner's mind and how instructors can avoid cognitive overload due to multimedia learning. Mayer's cognitive theory of multimedia learning forms the basic framework for understanding cognitive learning, which is of significant interest in the current research and the development and utilization of advance organizers in research methods classes.

### **Literature review conclusion**

In conclusion, the current literature indicates that there is a remarkable lack of educational and training resources for novice researchers in the 3Ps and in the 3Ps application to research practice. As a result, developing a learning tool that includes the 3Ps components may be an

essential factor to help novice researchers understand the 3Ps and how to use each to conduct rigorous and trustworthy research. In this study, an advance organizer for professional learning, was designed and developed based on relevant learning, cognitive development and processing, and multiple rules and theories. The theories provide rich descriptions of the phenomenon being studied. Therefore, the subsumption theory, cognitive multimedia learning theory, and the cognitive load theory of multimedia learning provide a collective knowledge base to define the characteristics of suitable learning material that can effectively and efficiently elucidate the complex ideas of the 3Ps for novice researchers without overwhelming their mental abilities. The advance organizer content was created from authoritative references using rigorous content analysis methods. In this research, the initial version of this advance organizer (content and form) underwent validation procedures to ensure its efficiency and utility as a learning tool by a group of multimedia experts. Then, novice researchers' perceptions and impressions about the advance organizer's use were collected for analysis of this tool's usefulness. The following chapter explains these two phased-methodology procedures extensively.

## **CHAPTER 3. METHODOLOGY**

### **Overview**

Novice researchers often fail to understand the importance of philosophical assumptions, guiding paradigms, and praxis in framing, conducting, and reporting on their research. Expert researchers are more likely to produce works that integrate their philosophical assumptions and guiding paradigms and are enacted with supportive Praxis or research methods. The literature confirms the need to address novice researchers' preparation to develop a fuller understanding of the 3Ps as a guiding perspective in good scholarly works. One approach to novice scholars' education is to use advance organizers to help novice researchers decipher the complexities of research. The literature provided evidence on the design of such an advance organizer through multimedia principles to support complex content learning. Using this literature, an advance organizer was developed on the 3Ps. This study examined the viability of the advance organizer of the 3Ps and then explores novice researchers' perceptions of the 3Ps and their impression of using the advance organizer of the 3Ps in their research thinking and practices.

### **Philosophical underpinnings in this study**

Researchers of humanities do not research merely for the sake of research, but because of the underlying motivation (B. Johnson & Christensen, 2019; Rubin & Babbie, 2016). I explicitly disclose to the reader my motivation to undertake the study and the philosophical assumptions that support this project. Since I earned my B.A. in Education and Arts, I have devoted most of my profession to teaching and developing instructional design in a higher education environment. Through my experience in academic work, I realized that most academic institutions focus on producing research. The number of publications is one of the essential criteria in the classification of academic departments and the most crucial commitment that faculty members must fulfill.



Therefore, faculty members realize the importance of research activities. Many faculty engage their students, especially graduate students, in research projects to prepare them for a future as a qualified researcher. However, many novice researchers face difficulty in understanding the science of research, due to many factors. One of the most prominent factors as indicated in the previous chapters, is their lack of understanding of the methods, philosophical assumptions, frameworks, techniques, and tools of research and scholarly work. Moreover, I often see an almost complete absence of the mention of philosophy, propositions, or paradigms in novice researcher works, even though they have a Doctorate of Philosophy (Ph.D.). Often even the term philosophy is missing in research works, except as mentioned on the cover page in the letter Ph.D.

According to Cellucci (2014), philosophy as a discipline pursues knowledge about the world, provides global views of issues, and investigates fundamental problems in building knowledge and utilizing the results of science. It uses scientific methods in search of new knowledge beyond contemporary science without depending on intuition but the connection to human emotion to generate open-ended questions about problems (Cellucci, 2014). In light of poor understandings of philosophy and its features, I must admit that I personally have suffered a lot of difficulties understanding this topic because of its challenging and complex terminology and the history of these concepts as interconnected, intertwined and spanning centuries, not to mention the cross arguments and debates that require a broad and deep reading. My room was full of interconnected conceptual maps, like that of a criminal investigator for a complex crime. However, while immersing myself in the literature on the subject of my research, Bertrand Russell's words struck a chord with me when he said, "*science is what we know, and philosophy is what we don't know*" (1950, p. 24). At that time, I understood that philosophy asks and science answers. In other words, to know, we must philosophize. The accumulation of experiences and facts lead me to a

sense of responsibility towards novice researchers, a call to think carefully in providing them with an educational contribution that lies in an advance organizer, thereby taming the "ghost" of philosophy, its complex terminology, and its relationship to research. I have taken many advanced research courses, participated in many discussions with research experts, and feel a high degree of reassurance about my understanding of philosophy and its relationship to research through my extensive reading of these topics. Also, I find myself adept at graphing and simplifying complex areas. In the past years, I analyzed hundreds of research references to extract what research experts agreed on about the main elements of the research, which contributed to enhancing my knowledge of the research elements. I have written a research paper in this regard using the thematic analysis approach. Consequently, the elements identified by the research experts were used to design a visual tool called the "Advance Organizer" to be validated as a learning tool and to explore novice researchers' perceptions of it. This became the focus of the current research.

The nature of this research's objectives stems from two different aspects: descriptive and exploratory. Therefore, data acquisition and analysis were conducted through various techniques knowing that they are all consistent with the inductive approach to the logic of arguments in data analysis. Also, my ontological and epistemological point of view differs according to the nature of each objective of this study. The following section explains the researcher's ontological, epistemological, and axiological assumptions in detail, and Table 5 briefly presents these assumptions.

Table 5. *Situation to Self of the Researcher (Philosophical Assumptions and Paradigms)*

	<i>(Phase 1)</i> <i>Validation study</i> Participatory paradigm	<i>(Phase 2)</i> <i>Intervention study</i> Interpretivist paradigm	<i>→ Phase 1 and 2 ←</i> <i>Overall study</i> Pragmatism paradigm
Ontology	Multiple realities exist for each subject of investigation, and the reality integrates with the interaction of subjective and objective perspectives.	Reality is subjective and is indirectly constructed based on individual interpretation. The causation is determined by interpreted meaning and symbols and events are distinct and transferable. There exist various perspectives on any one incident and people interpret and construct their own meaning of events.	The reality lies along action lines of joint activities or phases that different people or groups do together and align with what the study seeks.
Epistemology	Knowledge is obtained through the participation of the human mind with the world based on collaborative relationships between the researcher and the fields of expertise (expert thoughts).	Knowledge lies in establishing partnerships between the researcher and participants. Knowledge is acquired through personal experience and used inductively to generate a theory. Also, it results from particular events and is not reducible to simplistic interpretation.	The reality is known by combining incomplete observations of experience and reality in order to predict the truth.
Axiology	Research is value laden	Research is value-bound; the researcher is part of what is being researched, cannot be separated.	Research is values-oriented and aware of the utilitarian aspect of ethics to adequately achieve the purpose of the study.

**Ontological assumption:** The ontological assumption behind the study sheds light on the identity as well as the nature of reality (data) to be investigated. Given that this study seeks to achieve four main objectives, all of them focus on the nature of multiple realities. This study is based on two phases, where the first phase aimed to validate an advance organizer of the 3Ps as a learning tool by a group of experts, and the second phase sought to explore novice researchers' perceptions of the 3Ps in research, and to describe novice researchers' impressions about the

application of the 3Ps advance organizer into their research thinking and practice. Bear in mind that the results obtained in achieving the objective associated with the first phase contributed to achieving the objectives related to the second phase. For the first objective, data gathered from instructional design and multimedia experts on the effectiveness of the multimedia learning principles implemented in the 3Ps advance organizer. They were also be prompted to provide data on their overall perceptions of the 3Ps advance organizer as a learning tool. To accomplish this objective, Delphi technique was used to validate the advance organizer of the 3Ps based on the experts' common sense (cognitive knowledge) and experience in applying multimedia principles to the advance organizer. According to Howell (2013), the participatory paradigm is viewed as a co-created reality that emerges due to the interaction between the mind (*common sense*) and the world (*experience*).

According to Erciyes (2020), the participatory paradigm combines both objective and subjective realities in creating reality. The Delphi technique seeks to dig into phenomena and establish the reality based on personal expert opinions (subjective information) and expert experience on the topic of investigation (objective information) (Kezar & Maxey, 2016).

As for the third and fourth research objectives, the researcher used the interpretive paradigm as a lens to investigate the reality/data (the data given) that obtained to answer the third and fourth research questions. According to Creswell and Clark (2018b, p. 40), an interpretive paradigm is a suitable approach because it provides “an original, insightful contribution to the mixed methods literature by bridging the philosophy of inquiry (i.e., paradigms) with the practice of social justice research, primarily in the field of evaluation.” The use of the interpretivism paradigm gives the researcher an insight into the meaning associated with the participants' experiences and goes into depth on the data at hand (Engel & Schutt, 2017). However, this does

not separate the interaction between the researcher and the participant as that interaction is one of the characteristics of the interpretivism paradigm (Dudovskiy, 2018). Ontologically speaking, the interpretivism paradigm in this study assumes a set of different and multiple versions that are seen as realities. However, accepting differences in those realities is equally legitimate and ignores the damage caused by overlooking the factors that privileges one version of reality over another, like in terms of social, political, cultural, economic, and ethnic differences. Consistent with qualitative method research, the interpretivism paradigm recognizes power differences and ethical implications related to participants' differences, which provides a basis for social change (Biddle & Schafft, 2015). Overall, incorporating the interpretivism paradigm into the qualitative method and its design typology will help accomplish the second objective derived from research questions 3 and 4. However, the researcher uses the pragmatic paradigm as a large lens to view the reality of the data produced in the two phases. In pragmatism, reality and human experience are far apart, and therefore the existence of reality is only felt through human experience. Due to this, from a pragmatic viewpoint, a researcher should combine both the incomplete observations from experience and reality to predict the truth (Mitchell, 2018).

**Epistemological assumption:** the participatory paradigm was used in the first phase of the study which has a general ontological perspective related to individual and collective knowledge of reality (Ciesielska & Jemielniak, 2018), but the epistemological nature of the paradigm arises from experiential learning stemming from both participation as well as self-reflective directed actions. Here, qualitative method research may be used as the basis of the core methodology (Creswell & Creswell, 2018). On the other hand, epistemologically, the interpretive paradigm focuses on understanding how people are fundamentally different from objects and how they view things and the issues of power involved in defining what is considered legitimate knowledge

(Croucher & Cronn-Mills, 2018). The interpretive paradigm epistemology is acquired through an approach that “respects the differences between people and the objects of natural sciences and therefore requires the social scientist to grasp the subjective meaning of social action” (Grix, 2004, p. 64). This means that the relationship between the researcher and the participants is interactive and requires an awareness of the complexities of the learning and research experiences of that relationship. Therefore, the second phase of the study assumes that an interaction between the researcher and the participants is necessary in order to comprehend the impact of the 3Ps advance organizer on their research performance. The pragmatic research paradigm application is also used in both phase one and two of the paper. Epistemologically, the pragmatic paradigm does not regard reality as knowledge as it is constructed as a way of managing one’s existence and niche in the world. This means that the pragmatic paradigm will help with the establishment of reality about the instructional design of the advance organizer and explain or manage its existence (Kaushik & Walsh, 2019).

**Axiological assumption:** In this first phase design, the researcher places a framework within the participatory paradigm to validate an advance organizer of the 3Ps as a learning tool by a group of experts. Since the nature of data at this stage is multiple and requires the participation of a group of people in an organized framework/technique to obtain the targeted data, the Delphi technique is considered the best option for conducting this stage. Furthermore, the analysis steps may reflect convergent data analysis (i.e., convergent design) or sequential methods of data analysis (e.g., explanatory or exploratory sequential designs). The axiological assumption of the participatory paradigm views reality from a holistic cooperative perspective, and therefore, a researcher is free to use different methods of action research and participation in order to view reality in animated, active and co-created terms (Howell, 2013). On the other hand, and concerning

the second phase, axiologically, the interpretive paradigm of research assumes beneficence, justice, and respect as research's ethical requirements (Mertens, 2007). Said another way, the interpretive paradigm requires the researcher to demonstrate explicit recognition of the self/community's knowledge as the basis of methodological decisions (Mertens et al., 2015). Furthermore, the pragmatic paradigm's axiological assumption emphasizes the value-laden nature of the inquiry, which requires qualitative data in this study. The qualitative method is not free from bias, so researchers bring their bias to the qualitative study. According to Cassell et al. (2018, p. 178), “the subjectivity of the researcher is something to be embraced, not controlled for or eliminated.” While quantitative research encourages the elimination of subjectivity, although not feasible in reality, qualitative research advocates subjectivity adoption (Merriam, 2015). As is common in quantitative research, trying to hide bias impairs the research study's credibility, and clarifying the researcher's bias clearly helps increase the study's reliability (Costa et al., 2020). Therefore, a pragmatic researcher should focus their energy and resources on the achievement of research objectives. They should also use their values and experiences to advance their objectives and enhance the research results (Maarouf, 2019). Qualitative research and data encourage the researcher to be reflective (Patton, 2014). Reflexivity is the aspect of an individual being reflective of their own personal experience in the research process. It enables the researcher to take the other's attitude towards themselves, acclimate themselves to the research process, and then modify the resultant in different social acts relative to their adjustment. Reflexivity provides a mutual and continuing interaction between the research topic and the self, where the latter designs the research process. At the same time, the researcher gives meaning to the data collected through the process (Erciyes, 2020).

## **Research design**

This study focused on providing an advance organizer on the 3Ps as a learning tool for novice researchers, that was designed to help novices overcome the challenges they face in their understanding of the 3Ps. The advance organizer is the cornerstone of this study. Before seeking the perceptions of the novice researchers about this advance organizer, the advance organizer's form (look) was validated by experts in instructional design/multimedia principles to assure was an effective learning tool. Therefore, the study relied on a methodology that ensures compatibility between the achievement of the two study phases and provided the techniques through which data were collected to answer the research questions.

This study's methodology is described in two phases to achieve the following research objectives: First, to describe the opinions of experts in instructional design on the application of multimedia learning principles in the 3Ps advance organizer. Second, to describe the opinions of instructional design experts on the overall usefulness of the 3Ps advance organizer as a learning tool. Third, to explore novice researchers' perceptions about the 3Ps in research, and finally, to describe novice researchers' impressions about using the 3Ps advance organizer to support their research thinking and practices. The following is a breakdown of both phases:

- ***During the first phase***, a Delphi technique was used to provide evidence demonstrating instructional design experts' consensus on the use of multimedia learning principles as incorporated into the advance organizer of the 3Ps, as well as the experts' opinions of the usefulness of the advance organizer as a learning tool (Representational/face validity).
- ***In the second phase***, a phenomenological study was used, by conducting semi-structured interviews with novice researchers to explore their perceptions about the



3Ps and to describe their impressions on implementing the 3Ps advance organizer into their research thinking and practice.

In both phases, the study overall relied on the qualitative method and inductive approach as a basis for data analysis (Creswell & Plano Clark, 2018a). The first phase of this study was separate from the second phase in terms of research data collection tools. However, both phases were associated with each other in terms of methodology, as the data obtained in the first stage serve as inputs for the conduct of the second stage.

The guidelines in this study are outlined with the inductive approach that relays more into individual characteristics and fits quite well into a qualitative method that Aspers and Corte (2019, p. 155) defined as “an iterative process in which improved understanding to the scientific community is achieved by making new significant distinctions resulting from getting closer to the phenomenon studied.” Much consideration has been given to the methodological aspects of this study. The researcher realized that the main study objectives were achieved through qualitative data reasonably, in addition to his awareness of the tension between quantitative and qualitative researchers committed to epistemological loyalty. However, the qualitative method's design was used because it ideally fits this research's general purpose. Regardless of whether the researcher follows the position that reality is multiple or single, independent of the researcher or socially constructed, the study must adhere to established methodological criteria in rigor and trustworthiness. Most of the people who have a solid foundation in qualitative research know that the qualitative researcher is the main instrument; however, it may be noted that some qualitative researchers do not effectively explain what this means. Therefore, it is acceptable to assume that credible qualitative research is one in which “the researcher is the primary instrument for data

collection and analysis (Merriam, 2015, p. 15). Merriam (2015) mentioned four characteristics identified by most as key to understanding the nature of qualitative research:

- The focus is on process, understanding, and meaning.
- The researcher is the primary tool in collecting and analyzing data.
- This process is inductive.
- The product is richly descriptive.

Figure 6 shows the conceptional framework for this study, which is consistent with the definition of Miles et al. (2013, p. 37) that “A conceptual framework explains, either graphically or in narrative form, the main things to be studied—the key factors, variables, or constructs—and the presumed interrelationships among them.” Additionally, all the elements in Figure 6 were taken into account in an appropriate and rigorous manner to what Ravitch and Riggan (2016, p. 26) described in their saying:

a conceptual framework should argue convincingly that the research questions are an outgrowth of the argument for relevance; the research design maps onto the study goals, questions, and context; the data to be collected provide the researcher with the raw material needed to explore the research questions; and the analytic approach allows the researcher to effectively address those questions.

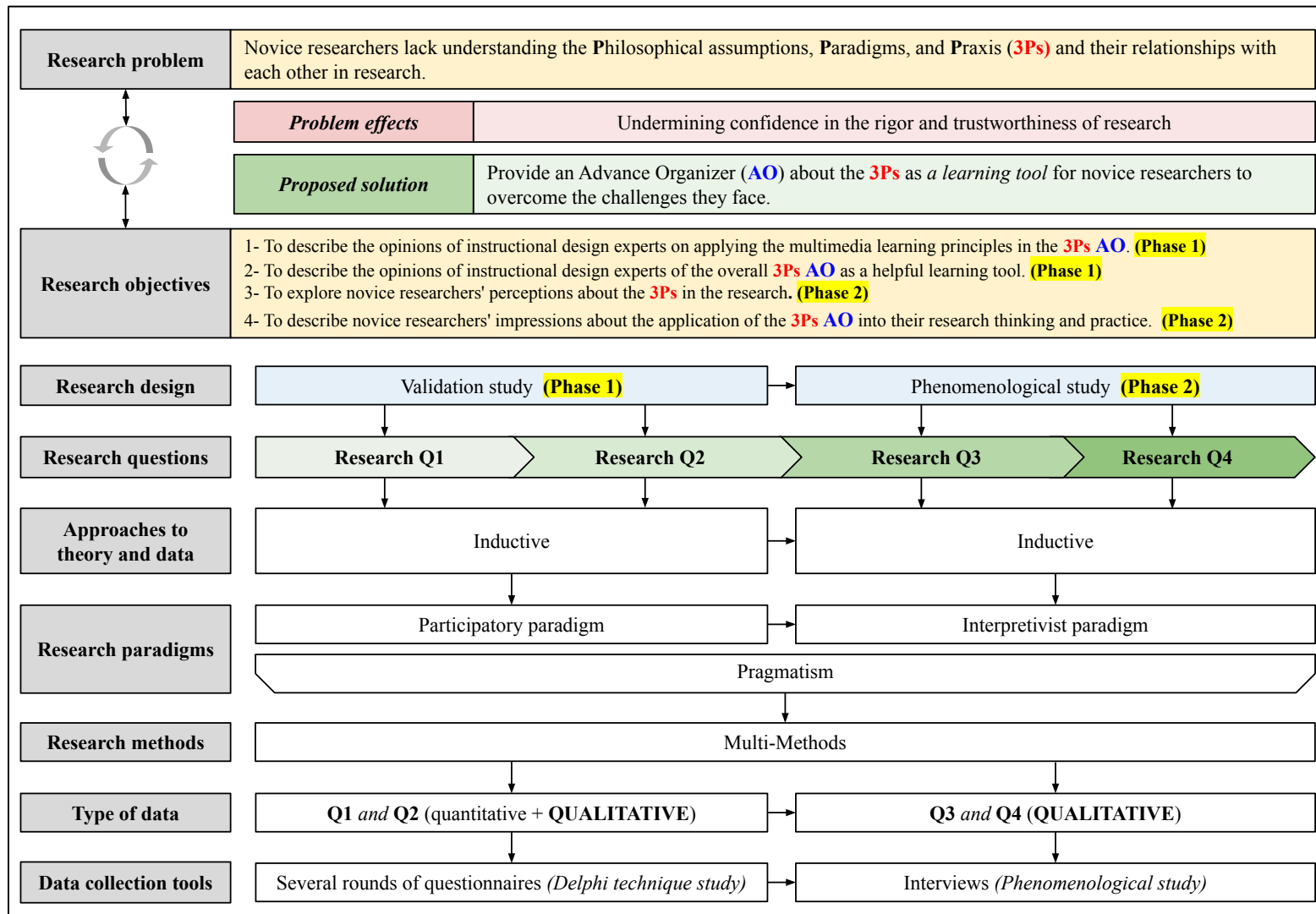


Figure 6 the Conceptual Framework of this study

## Research questions

This study attempts to answer the following research questions:

### **Phase 1: Validation study of instructional design of advance organizer**

1. To what extent do instructional design experts agree that the multimedia learning principles were used in the 3Ps advance organizer?
2. To what extent do instructional design experts agree that the overall 3Ps advance organizer is a helpful learning tool?

### **Phase 2: Phenomenological study**

3. What are the novice researchers' perceptions of philosophical assumptions, paradigms, and praxis in research?
4. What are the novice researchers' impressions about using the 3Ps advance organizer in their research thinking and practice?

As mentioned above, this study consisted of two successive phases, each with a different data collection technique, which is illustrated in the Practical Framework in Figure 7. *In the first phase, the Delphi technique* was used to collect and distill expert judgments based on an online series of feedback-seeking. In this case, an online questionnaire extracted expert feedback/responses concerning the advance organizer's instructional design validity. In other words, three rounds were conducted with experts in instructional design, in which they were asked to provide opinions to validate the use of multimedia principles in the design of the 3Ps advance organizer and help ensure its suitability as a suitable learning tool for novice researchers.

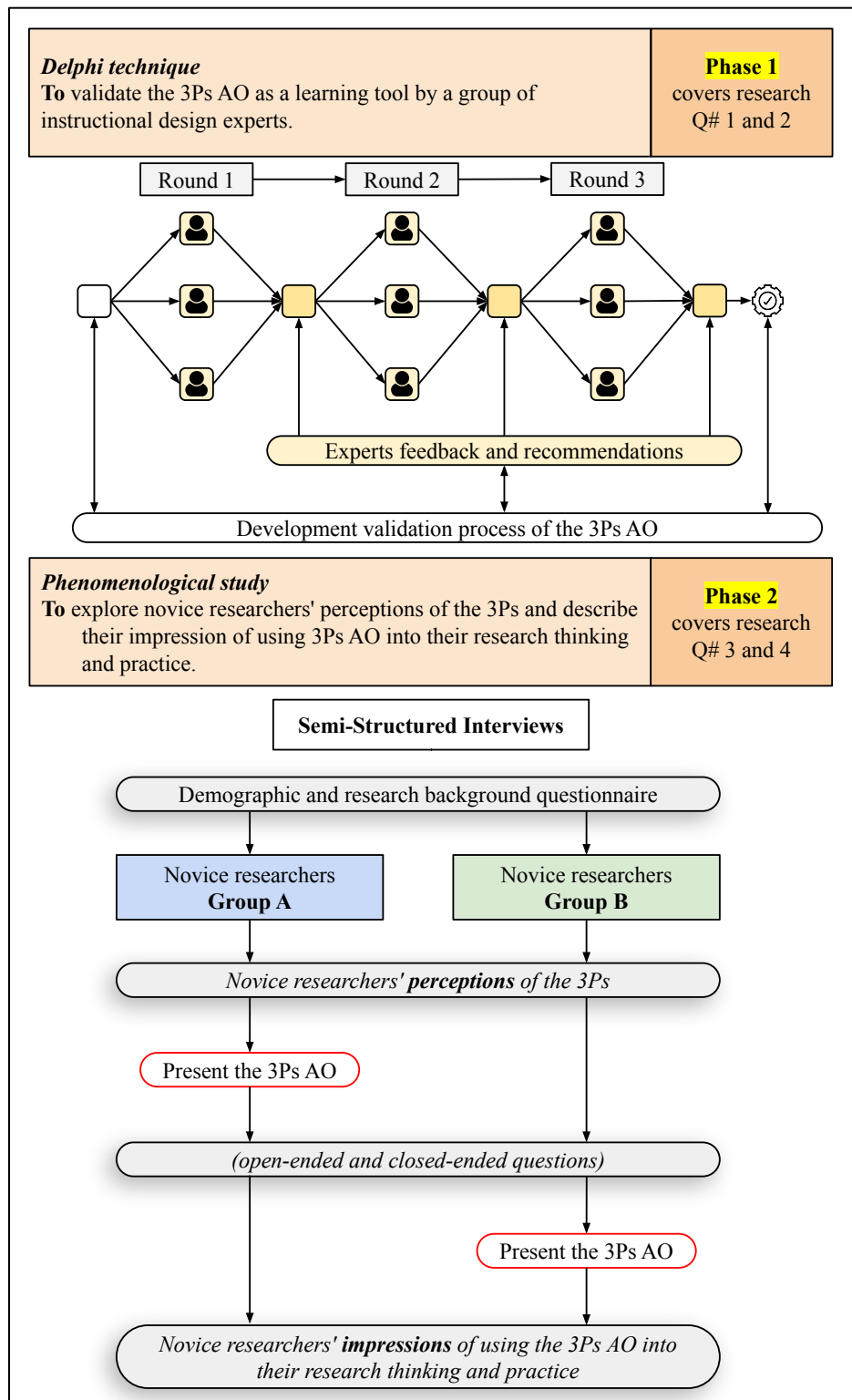


Figure 7. Practical Framework of this study

In the second phase, the study of phenomena through individual interviews with novice researchers was used to explore participants' perceptions of the 3Ps in research and describe their impressions about applying the 3Ps advance organizer into their research thinking and practice. Phenomenology is a qualitative method in which meanings are key to the investigation of an individual's experience (Owen, 2015).

In principle, Moalusi (2020) said that the choice between a qualitative and quantitative research method appears only after determining the ontological assumption, indicating the secondary role of categorical or numerical data in itself in the research description. This view is consistent with Maxwell's (2010) statement that the presence of categorical or numerical data is not useful in distinguishing between qualitative and quantitative research. Therefore, characterizing research as qualitative, as it is not dependent on numerical data, is reasonable but tends to mask the complexities inherent in such classification.

It should be noted that phenomenology appears in some literature as a philosophy of existence and in research references it appears as a research design despite the difference between them. In this study, the researcher adopts the concept of phenomenology as defined by Owen as a combination of perceptions and impressions, how events are depicted and their subject matter, what and how signs indicate, how words refer to their references, how memories reintroduce and reintroduce the past present, and, how automatic and involuntary memories—retrograde consciousness—stores and retains past learnings in the automatic experience of recognizing an identification (Owen, 2015). The phenomenologist goes beyond prior knowledge and experience to understand a phenomenon at a deeper level (Merleau-Ponty, 1982). Macann argues that phenomenology is “a descriptive science and so has to be distinguished from any science which would seek to explain, that is, from science commonly so-called, and this because phenomenology

cannot take for granted the reality of the world which forms...” (1993, p. 161). The second phase includes two research questions that were investigated through semi-structured interviews with novice researchers. A semi-structured interview is a more systematic and pre-planned method than a non-structured interview (Olsen, 2012). In semi-structured interviews, several authors such as Galletta and Cross (2016) and Olsen (2012) recommend that the researcher should not create a questionnaire so as to not limit the freedom of the interviewee’s response pattern.

### **Research ethics**

In order to assure ethical standards of research were met and that the rights of all participants were fully protected, the researcher completed web-based training courses that include research ethics, the voluntary nature of research participation and the consent process, and standards for maintaining the privacy of the participant and the confidentiality of the data collected, with the Collaborative Institutional Training Initiative (CITI) Office of Extramural Research Certificate of Completion on April 12, 2020; Certification Number: 36252280. The researcher then independently submitted the protocol for both phases to the Institutional Review Board (IRB) at Syracuse University, after which the researcher received approval to conduct both phases. Appendix shows the IRB approval of the Delphi study, and Appendix shows IRB approval of the second study—the interviews with the novice researchers.

### **Content validity of the instrumentation / protocols**

Prior to starting the data collection process, the study instruments, including demographic questions, instructions, the 3Ps AO, and Delphi survey questions was subjected to a content validity review by a group of researchers with similar characteristics to the research participants. During this instrument validity review, the instruments were examined to reduce ambiguity, leading questions, emotive questions, and stressful questions, and to ensure that the procedures,

with these instruments, could be achieved as planned. This instrument validity procedure reflects activities to achieve face validity or what is also called logical validity or internal validity (Lewis-Beck et al., 2004). More specifically, participants in the content validation process responded to questions as to whether each item should be included in one of the three specific responses: “Accept as is,” “Accept with change,” or “Delete item.” They also added the explanation when choosing the second and third answers. Their comments and responses contributed to adding more quality to the work. Some members also praised the topics covered in this study, which they said seemed interesting and useful. This procedure is consistent with what is recommended by many experts such as Aspers and Corte (2019), Costa et al. (2020), Merriam (2015), Morgan (2014), and Schneider et al. (2016), and implementing these procedures contributes to achieving the utmost rigor and trustworthiness in qualitative research.

### **Participants**

**With regard to the first phase**, as mentioned above, three rounds of investigation have been conducted using the Delphi technique with a group of instructional design experts purposively selected according to specific criteria. According to Merriam (2009) and Patton (2014), participants can be purposively selected to identify information-rich cases, and this technique is widely used in social science studies for the most effective use of limited resources. The most common form of purposeful (judgmental or expert) sampling is criterion sampling (Edmonds & Kennedy, 2017), and it involves identifying and selecting individuals that are knowledgeable about or experienced with a phenomenon of interest (Creswell & Plano Clark, 2018a). Also, Patton, (2014, p. 425) added that “the logic of criterion sampling is to review and study all cases that meet some predetermined criterion of importance, thereby explicitly (or implicitly) comparing the criterion cases with those that do not manifest the criterion.”



Therefore, instructional design experts were identified according to the following criteria and considerations:

- according to Ericsson et al. (2007) to be an expert on a matter, it may take about ten years or (or approximately 10,000 hours) of deliberate practice, which in this study applies to practice instructional design;
- holds a doctorate degree in instructional design or any related discipline;
- published scholarly works in the instructional design field, and;
- familiar with the principles of multimedia learning.

Delphi technique does not use a random sample that represents the target population; Instead, researchers use a *purposive sample* of a group of subject matter experts to gather opinions about a specified topic. The concept of the “expert” was defined in the literature as the person specialized in a specific field (Nichols, 2017), and as a knowledgeable and wise person in a specialty, by objective exceptional performance (Ericsson et al., 2018); or someone with a solid knowledge of a particular topic (Addis & Winch, 2019). Also, Ericsson et al., (2018, p. 27) referred the expertise to “the characteristics, skills, and knowledge that distinguish experts from novices and less experienced people.” Accordingly, the characteristics, skills, and knowledge of the nominated persons are taken into account when specifying samples in this technique. Purposeful sampling is described as a technique used in the identification as well as the selection of info-rich cases as the sources of the research data, especially when exploring a topic with limited informational resources (Palinkas et al., 2015). Therefore, it involves targeting persons with demonstrable knowledge and experience in the subject of the study (Palinkas et al., 2015). Nevertheless, measuring against these definitions requires one to look at indicators of knowledge rather than knowledge per se. The following list contains such indicators: research in the area as

identified by publications and grants, citations of work, degrees/awards/or other types of recognition, recommendations and nominations from respected institutions or persons, positions held, membership or appointment to review boards, commissions (Hora, 2009).

There is no consensus about the size of the expert sample for the Delphi technique, as the sample size varies from one study to another according to several factors. Mitchell and McGoldrick (1994) state that the expert sample size can be large when there are sufficient resources, such as time, money, and other considerations, but it must be at least eight experts. Hallowell and Gambatese (2010) indicate that most Delphi studies include eight to sixteen experts. Skulmoski et al. (2007) also argue that a sample of ten experts is a reasonable number if composed homogeneously and draws their similarities from common know-how and experiences. The Delphi technique is also one of the techniques through which quantitative and/or qualitative data is collected in sequence or convergence in multiple rounds through expert feedback. Besides, the Delphi technique's advantages and characteristics formed the basis for collecting data to be used in answering the first and second questions in this study.

In general, sampling techniques generally have two main categories: probability and non-probability sample (Peers, 2006). Non-probability sampling techniques are those in which participants are not randomly selected from the entire study population (Jager et al., 2017). The sample in both phases of this study is a non-probability sample, which means that they were not chosen randomly from the entire population, i.e., they were purposively selected. Table 6 shows each of the two phases and their associated research questions, the techniques used to collect the data for each phase, the types of samples, and the minimum sample size.

*Table 6. Data collection tool, sampling, and the minimum sample size*

<b>RQ</b>	<b>Type of data collection tool</b>	<b>Types of sampling</b>	<b>Participants</b>	<b>Min. sample size</b>
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Phase 1	1&2	Delphi technique	Purposive sampling	Group of Instructional design experts	10+*
Phase 2	3&4	Interview	Homogeneous convenience sampling	Novice researchers	8+*

\* Data were collected from these samples until the saturation point was reached

A **non-probability homogeneous convenience sampling** technique was used to determine the sample population *concerning the sample in the second phase*. Kuzel (1999a) recommends 5–8 participants for a homogeneous sample. Creswell (2013) recommended interviewing up to 10 people for phenomenological research. However, others such as Heidegger (2005b), Moustakas (1994a), and Van Manen (2014) argue that the researcher should not be concerned with sample size in phenomenological research, as the main goal is to gather as much in-depth descriptions as possible from the participants. From this, it becomes clear that the sample size factor is not the focus of this method's attention.

Consequently, the focus was on obtaining detailed and in-depth data on this study's phenomenon through a non-probability homogeneous sample. Non-probability homogeneous sampling is a sampling technique where research participants are selected based on convenience (ad hoc) due to their proximity to the research environment or accessibility (Jager et al., 2017). As shown in Figure 8 the study population is the researchers in general; however, this study targets academic researchers, specifically novice researchers, so industry researchers are excluded. For further clarification, an academic researcher is defined operationally in this study *as a person who seeks knowledge systematically to answer research questions, solve a problem, or create new knowledge, whose work is subject to accreditation by a group of academic experts to publish or obtain a degree in higher education*. This operational definition may include multiple clusters of

the academic population. Novice researcher is defined operationally in this study *as a master or doctoral student who studied at least two research courses at the graduate level and required to conduct academic research.*

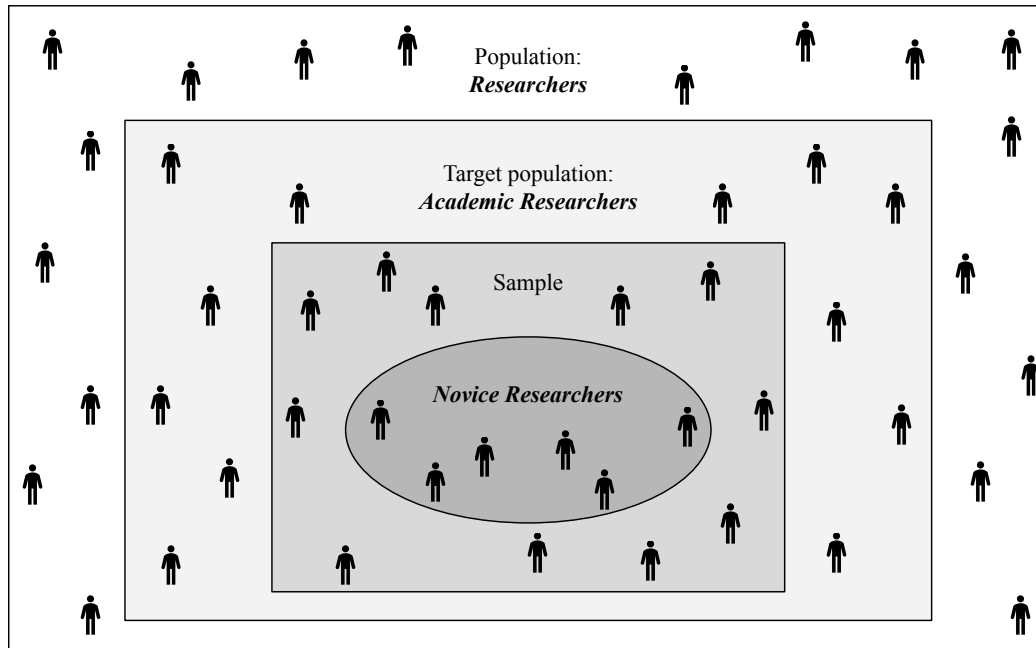


Figure 8. Population, target population, and individual samples

Johnson and Christensen (2019) stated that convenience sampling for exploratory and descriptive studies is an appropriate option, especially if there are specific qualifications required in the participants. Selection of the non-probability sample in the research does not negatively affect its quality as some researchers believe; alternatively, it may be an ingredient of the study quality if it is used within a coherent methodology that reflects the objectives of the study, and this applies to other types of samples (Cochran, 1977; Gideon, 2012; Graham, 1983). Given that the main objectives in the second stage, which seek to obtain in-depth and specific knowledge from a specific sample of the study population, the homogeneous convenience sampling technique is appropriate to achieve the objectives of the study adequately and effectively, and therefore the generalization of the results will be sacrificed in this study. However, in return, the result can be

transferred to other contexts or settings by doing a thorough job describing the study context and the assumptions that were central to the research (Trochim et al., 2015).

## **Design and procedures**

### **Phase I:**

Since the 3Ps advance organizer in this study represents the cornerstone of the methodology and is the pivotal link between the two study phases, this phase's focused on producing an advance organizer validated by instructional design experts. This phase was based on in-depth detailed validation procedures in multiple rounds.

The knowledge obtained at this phase was contribute to a theoretical framework that includes multiple theories which have been detailed in the literature review section. This contribution is in the interest of researchers, experts, and practitioners in instructional design. Also, the methodology that has been implemented at this phase can provide a guide for those interested in validating visual learning tools. This study's results can also be re-examined, applied to other educational content, or the framework of knowledge expanded in the same content and context.

Prior to the first Delphi round, five individual steps were taken: preparing a knowledge resource nomination worksheet, populating that worksheet with names, adding nominating experts, ranking experts by modifications, and inviting experts to the study. The five-step process ensures the identification and invitation of the most qualified experts available, as outlined by Okoli and Pawlowski (2004).

Initially, a list of potential participants was prepared in the first phase. The list was compiled through public databases using semantics and keywords related to the topic of study in order to find people with research activities related to this regard. Table 7 shows the keywords that were used in the databases to obtain the experts. Note that this was not the only action that was

taken to obtain experts, as through the results that emerged from the databases, the search section expanded to other sources, which naturally led to obtaining more people of relevance. Then I conducted secondary reviews on these people, using their information such as names, email, and titles that were publicly posted in their publications, to confirm their relevance to the field of instructional design. The search went on like this until I came across a list of over 120 potential instructional design experts. All the information obtained in this way is public information published in the literature, and therefore, no private information has been violated in this stage.

*Table 7. Knowledge Resource Nomination Worksheet*

Keywords used	Databases
• Instructional Design	• SAGE Knowledge
• Multimedia Learning Principles	• Scopus
• Coherence Principle	• EBSCO eBooks
• Signaling Principle	• Education Source
• Spatial Contiguity Principle	• Educators Reference
• Pre-training Principle	Complete
• Modality Principle	• JSTOR
• Multimedia Principle	• ERIC
• Personalization Principle	• Google Scholar
• Image Principle	• ResearchGate
• Reduce Extraneous Processing	• Academia
• Manage Essential Processing	
• Increase Germane Processing	
• Graphic Design	

Keywords used	Databases
<ul style="list-style-type: none"><li>• Multimedia Learning Theory</li><li>• Cognitive Load Theory of Multimedia Learning</li><li>• Subsumption theory</li></ul>	

After preparing an initial list of experts' names and e-mail addresses, an e-mail invitation was sent to each expert individually. The invitation letter included general information about the study, its objectives, procedures, timeline, potential risks, and their rights, as well as the potential benefits of their participation in this study.

Appendix 4 shows the invitation letter sent to Instructional Design Experts. The invitation letter also included a link to a questionnaire to collect the participants' demographics and their research backgrounds, which they completed before the start of the first round. This questionnaire contained 12 questions, see Appendix 7. This questionnaire was implemented for many reasons, the most important of which is to closely identify their educational and research background and their interest in the subject of study. Also, from information they provided to specific questions, people whose characteristics match the experts' pre-defined criteria in this study were carefully identified, and people whose characteristics did not meet those criteria were excluded. Appendix 7 presents the demographic and research background questionnaire for instructional design experts.

Before collecting data in both phases, all study instruments, including demographic questions, instructions, 3Ps Advance Organizer, Delphi survey questions, and interview questions, were subjected to the content validity by a community with the same characteristics as the actual participants in each phase in order to review each question item—with an eye towards reducing ambiguity, leading questions, emotive questions, and stressful questions, and also to ensure that the procedures can be achieved as planned. These procedures reflect face validity or what is also called logical validity or internal validity (Lewis-Beck et al., 2004). Content validation participants were asked to clarify whether each item should be included in one of the three specific responses: “Accept as is,” “Accept with change,” or “Delete Item.” If the answer is “Accept with changes,” they were asked to submit the proposed change, and if the answer is “Delete Item,” they are asked to explain that choice. This procedure is consistent with what is recommended by many experts such as Aspers and Corte (2019), Costa et al. (2020), Merriam (2015), Morgan (2014), and



Schneider et al. (2016), which contributes to achieving the rigor and trustworthiness of qualitative research.

An initial advance organizer was developed based on a comprehensive review of the research literature as well as the result of thematic analysis in a recent study conducted by Alogailly and Koszalka (2020) based on hundreds of research references in order to identify the main elements of the research, their branches, and the relationship between them. Specifically, in the first version of the advance organizer and as shown in Appendix 1, the content of the 3Ps and their branches are included, and their relationships to one another were also highlighted. This advance organizer is a static learning tool (meaning not dynamic), divided into five sections on one page. Experts provided their feedback and opinions by looking at the principles of multimedia learning that corresponded with the static learning media; the principles related to dynamic media such as sound, movement, and interaction were excluded.

In the first round of Delphi, each expert was asked to review the advance organizer of the 3Ps and provide feedback on the representation of multimedia learning principles compatible with static learning media, where principles related to dynamic media such as sound, movement, and interaction were excluded either in the development of the advance organizer or in the rubric. Based on the experts' comments and feedback in the first round, the researcher made the necessary adjustments to the advance organizer and then re-sent the rubric survey to the experts as the second round of Delphi with the same nature of questions that were asked in the first round, and it continued in this way until reaching the point of agreement.

After reaching a point of agreement by instructional design experts on the use of multimedia learning principles in every part of the advance organizer, a final round was held to gather their opinions on the overall advance organizer as a helpful learning tool. More specifically,

in this round, their judgment is on the advance organizer as one piece. The second and third rounds' invitation included reports that each participant received separately, containing their answers in the previous round, to remind them of the previous responses and whether they would like to change their answers based on the changes made to the advance organizer. Table 8 shows the timeline of the Delphi rounds.

*Table 8. Delphi rounds schedule*

<b>Delphi rounds #</b>	<b>Survey availability</b>		<b>Report</b>
	<b>from</b>	<b>to</b>	
Round 1	11/05/2020	11/25/2020	12/05/2020
Round 2	12/05/2020	12/25/2020	01/05/2021
Round 3	01/05/2021	01/25/2021	

The rubric form was developed online via the Qualtrics platform. The researcher designed the tool in a way that allowed experts to easily access the tool and effectively provide their feedback about each element using a computer or mobile device. As technology advances, more effective alternatives to the traditional Delphi technique have emerged—making Delphi stages reach completion in a few weeks instead of months (Keeney et al., 2011). Nevertheless, the researcher realizes that the issue of time depends on several factors, the most important of which is strict adherence to procedural steps, full readiness to face the expected challenges and risks, and to provide alternative solutions when needed.

In general, instructional design experts provide their judgments on using multimedia learning principles in the advance organizer according to three considerations: to reduce extraneous processing (by focusing narrowly on the essential material and eschewing everything that could distract learners), secondly, to manage essential processing (by chunking elements and

identifying technical terms in advance), and thirdly, to increase germane processing (by scaffolding learning and pacing concepts appropriately).

For the advance organizer to be considered a learning tool, each of its sections was developed according to the learning objectives and classified each objective's behavioral structure according to Bloom's taxonomy. Since the desired goal after the three rounds of Delphi is to introduce the advance organizer to novice researchers—as will be explained in the next part—in order to describe their impression of an understanding of the 3Ps, all learning objectives were categorized at the level of understanding that Paul (1985) defined as “*demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating the main ideas.*”

## **Phase II:**

After taking experts' opinions and reaching their consensus on the use of multimedia principles in the advanced organizer and their validation, the researcher proceeded to conduct the second phase, which started with selecting the novice researchers using the homogeneous convenience sampling technique to conduct semi-structured interviews with them. The interview consists of five main sections in one-time frame:

1. The demographic and research background of the participants. (Collected one week before the interview - Appendix 12)
2. Perceptions of the participants about the 3Ps. (Collected during the interview - Appendix 13)
3. Participants' impressions about using the 3Ps advance organizer into their research and practice. (Collected during the interview -Appendix 13)

4. Open and closed questions about the 3Ps and research concepts in general. (Done during the interview - -Appendix 13)

To identify the researchers' perceptions about the philosophical assumptions, paradigms, and praxis, the researcher defined the intended perception in this study because the concept of perception in literature is multidisciplinary and complex and has several layers and different uses. In physiology, perception is examined based on stimulation of neurons and monitoring of subsequent physical activity (McDonald, 2012). However, the researcher in this study adopts the concept of perception defined by Audi (2011, p. 16), as "a source of knowledge and justification mainly by virtue of yielding beliefs that constitute knowledge or are justified." Also, Audi mentioned four elements in perception: (1) the perceiver, (2) the object, the field that the perceiver sees or think about, (3) the sensory experience, and (4) the relationship between the object and the subject, which is usually considered a causal relationship with which the object produces the perceiver's sensory experience. The researcher structured the interviews with the novice researchers to meet the previous elements effectively to respond to the main research questions. Given (2008, p. 606) stated that, "qualitative researchers are most interested in individual perception to gain access to understanding the meaning of experience for an individual, a culture, and or social groups."

However, in terms of the procedure, determining the research objectives is the actual starting point for conducting research after the researcher's curiosity has developed towards a phenomenon (Nishishiba et al., 2014). Explicitly defining the research objectives also contributes to selecting appropriate data collection tools (Creswell & Poth, 2017b).

According to Moustakas (1994a), study participants should have an interest in the phenomenon when conducting a phenomenological study. Therefore, all participants (novice

researchers) completed an initial questionnaire before conducting the interviews to ensure their interest in the phenomenon studied. The questionnaire also included questions whose answers revealed the participants' characteristics and through which the extent of their characteristics conformed to the criteria set by the researcher for the participants in this phase, which described in the Participants section above. The expected time to complete the initial questionnaire was approximately 10 minutes. After the researcher received the responses of the participants in the part related to the demographic and research background, the necessary arrangements were made for the interview and an appropriate date was set for both parties. In addition, the participants were divided into two groups, as shown in Figure 9. The sequence of steps of the two groups is identical except in the advance organizer presentation part, where it is presented in Group A before the test and is presented in Group B after the test. To clarify, this is not an experimental study, but rather a qualitative phenomenological study to closely identify the participants' impressions in both cases.

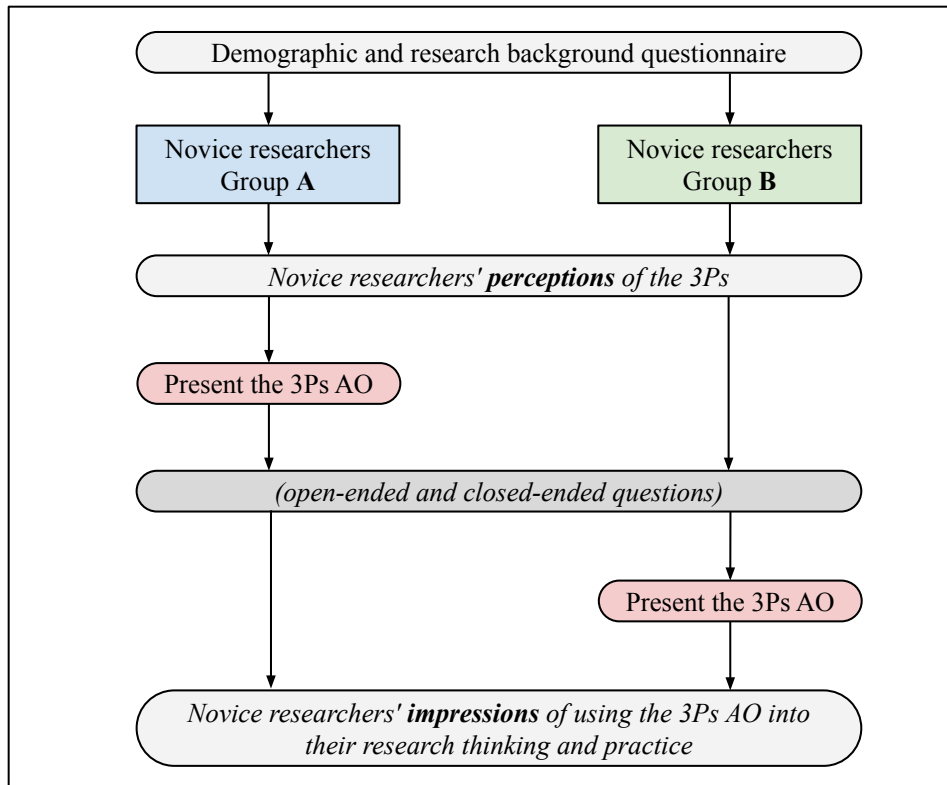


Figure 9. Interview sections and its flow according to each group of participants

In addition, all participants were required to complete a consent form prior to the interviews, which appears in Appendix 10. Participation is voluntary, and there was no coercion or question about who chose not to complete the interview. The researcher took into account the effect of incentives in order to join this study. Therefore, each participant received one gift card of \$100 as an appreciation of the effort and time spent on this interview. Each interview took about an hour and a half, and an interview invitation with required instructions was emailed to each person selected. To preserve the participants' confidentiality, a symbol (~pseudonyms) was assigned to each participant in the research, as that alternative name was used in the text of the dissertation instead of the participants' actual names. Participants' statements that include their identity or program identity were reformulated. The entire interview was recorded for each individual after obtaining their permission in advance, and all personally identifiable information

of the participants, such as their name, name of their organization, e-mail address, and interview recordings was placed on a secure and password-protected computer. The researcher is the only person who had access to the computer. Participants were informed that all personally identifiable information of the participants will be deleted after the completion and defense of the dissertation.

### **How these data were treated, analyzed, and reported**

Since the two phases of the study depend on the inductive approach to data analysis, this research used the thematic analysis technique to examine the data in both phases. Thematic analysis is one of the many techniques and tools used to identify themes or patterns of meaning. Thematic analysis is very popular and widely used in psychology (Clarke & Braun, 2017). “Comparing and contrasting is a critical research tool for making sense of the world” (Carpi & Egger, 2008). Thus, data for the two phases were compared and contrasted individually as cases and across groups of participants whose individual characteristics are similar to obtain in-depth and detailed information about participants' responses to the points presented in the study tools that seek to answer the questions. The technique entailed coding data for themes that relate to the research questions and then making an interpretation of the thematic structure to identify thematic commonalities, relationships, predominant patterns, theoretical constructs, or clarifying principles (A. Mills et al., 2012). The researcher takes many considerations about the trustworthiness of the data, its rigor, and how to analyze it, especially in the data through which the validity of the advance organizer will be determined, which was explained in detail in the following two chapters.

## CHAPTER 4. RESULTS OF THE FIRST PHASE (*Delphi study*)

### Introduction

Novice researchers often struggle to understand and relate philosophical assumptions, paradigms, and praxis in framing, conducting, and reporting on their research. Expert researchers likely produce works that integrate their philosophical assumptions, descriptive paradigms, and enactments through supportive praxis. The literature emphasizes the need to address novice researchers' preparation to develop a fuller understanding of the three elements of research as a guiding perspective in good scholarly practices. The literature has shown that these three elements and their relationship to each other are rather complex. One way to deconstruct complex content and understand it well is to use learning tools such as advance organizers to apply multimedia learning principles. This chapter focuses on validating the employment of multimedia learning principles in an advance organizer of the three elements through a panel of instructional design experts on multiple rounds of Delphi.

This study consisted of two phases. In this chapter, the results of the first phase are presented, and in Chapter 5, the results of the second phase will be presented. Each stage differs from the other in terms of tools, data collection techniques, and the study population, which are explained in detail in the methodology chapter.

This chapter presents the results of the first phase of the study, describing instructional design experts' opinions about the validity of the 3Ps Advance organizer (AO) as a learning tool. In this stage, data were collected through the use of a Delphi technique. The Delphi technique, that was explained in more detail in the Methodology chapter, is concerned with collecting experts' consensus on multiple rounds of a given topic. In this study, the opinions of instructional design



experts were gathered on the application of multimedia learning principles in the 3Ps AO and describing their views on the overall 3Ps AO as a helpful learning tool.

The data results in this chapter will be presented in four sections:

- A description of the experts' demographics and their research backgrounds;
- Delphi first and second round results that respond to the first research question;
- Delphi third round results that respond to the second research question, and,
- A final section that provides a summary of these data.

Each section includes a description of what these data mean and how they respond to the research questions. In general, the data collected in this study were qualitative in nature and they were analyzed using an inductive approach which was extensively explained in Chapter 3.

Since the nature of the study objectives in this phase was descriptive, i.e., seeking to describe the data-rich content, technical tools were used that allowed results from the Delphi rounds to be extracted in an effective and consistent manner. Table 9 shows the Delphi study's primary agenda with associated activities and the timeline for achieving each process; these steps follow the process outlined by Okoli and Pawlowski (2004).

*Table 9. Delphi study process and timeline*

<b>Processes</b>	<b>Timeline</b>	
	<b>From</b>	<b>Achieved</b>
Draft instrument – and exploring lit review related	02/06/2019	04/01/2020
Face/content validity	04/05/2020	05/29/2020
Preparing a knowledge resource nomination worksheet	06/01/2020	07/01/2020
Populating that worksheet with names		
Adding nominating experts	07/02/2020	10/01/2020
Ranking experts by modifications		
IRB approval	10/04/2020	11/03/2020

Processes	Timeline	
	From	Achieved
Inviting experts to the study		
Survey about the participants' demographics and their research backgrounds	11/04/2020	11/25/2020
Round #1		
Advance organizer content modifications after R#1 feedback	11/26/2020	12/04/2020
Round #2	12/05/2020	12/25/2020
Advance organizer content modifications after R#2 feedback	12/26/2020	01/04/2021
Round #3	01/05/2021	01/25/2021

Ideas on how to present qualitative data has undergone many changes over the years and has taken on significant dimensions that respond to political aspects of research (Lather, 2004; Maxwell, 2004). The mundane yet rich written description of the past has been a hallmark of qualitative data for decades (Bazeley & Jackson, 2013). The rigorous bifurcation of qualitative and quantitative had outlined strict characteristics for identifying qualitative data, but unfortunately, this generated adverse effects and often came at the cost of reducing the artfulness and creativity of data presentation (Emden & Sandelowski, 1998; Gordon, 2018; Janesick, 1994). Hallett (2014) and Whittemore et al. (2001) also argued that the strict application of how data are presented in research is a result of “methodological idolatry.”

The most appropriate technique to achieve the objectives of this phase is therefore to use *Thematic Analysis*. Many qualitative experts such as Clarke and Braun (2006, 2013), Given (2008), and Maguire and Delahunt (2017), praise the importance of conducting thematic analysis in rich data sets.

The researcher has extensive experience in using MAXQDA software. His experience helped him substantially in data preparation and analysis, to meet the objectives effectively and

efficiently. The steps shown in Table 9 included many sub-activities that required much effort to complete, such as coding and programming various options in the Delphi survey—developed in Qualtrics—to appear to the participants smoothly and conveniently.

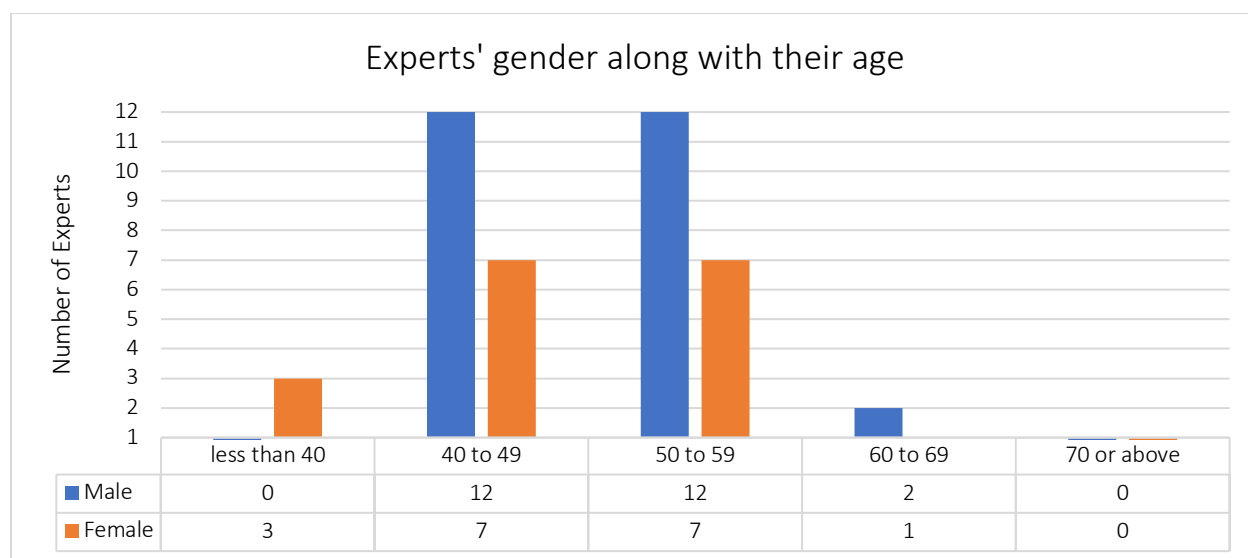
From this preparation, and trending away from imitation analysis techniques, these data are presented and described in this chapter and the next chapter exemplifying the researcher's fundamental conviction that data should be presented directly and simply to the reader, shying away from unnecessary lengthiness and verbosity. The use of numbers and statistical tables in qualitative data has become widely accepted in recent years (Moalusi, 2020). Scholars such as Bengtsson (2016), and scholars like Maxwell (2010), and Monrouxe and Rees (2020) have implemented and provided guidance on how to use descriptive analysis in qualitative data. This researcher has dutifully put these guidelines into action in this chapter.

### **A description of the Delphi participants' demographics and their research backgrounds**

Invitation letters for the Delphi study were sent to 120 experts in instructional design. The letter included complete information about the research and the timelines, as shown in

Appendix 4. The invitation letter also contained a link to take participants to a questionnaire prompting information on their geographical location and research background. Other key data were also collected to verify their credentials as qualified experts. All questions were compulsory with resulting data being used in the data analysis process except the participants' name in order to preserve confidentiality.

After sending the first invitation, a small number of experts agreed to join the study, thus a second invitation was sent to attract a larger sample. Overall, forty-four experts agreed to join the study and completed the demographic and research background questionnaire. Figure 10 shows a cross-chart tabulation of the age and gender of the experts who completed the demographic and research background questionnaire. Results show that there were 26 male and 18 female participants, ranging in age from less than 40 to 69. A majority were between 40 and 59 years of age.



*Figure 10. Age and gender of experts who completed the demographic questionnaire*

Figure 11 shows the experts' work status along with their age, as there were six options of work status in the survey, which included a faculty member [n=34], full-time employee (Instructional Designer/Learning Designer) [n=9], part-time employee (Instructional

Designer/Learning Designer) [n=1], retired, not employed, or others (who were asked to specify). After analyzing the responses, none of the experts fell into the last three work statuses. Therefore, as shown in the following table, all experts who completed the demographic background questionnaire were faculty members, full-time and part-time ID employees. Figure 12 shows the status of the experts, along with their gender.

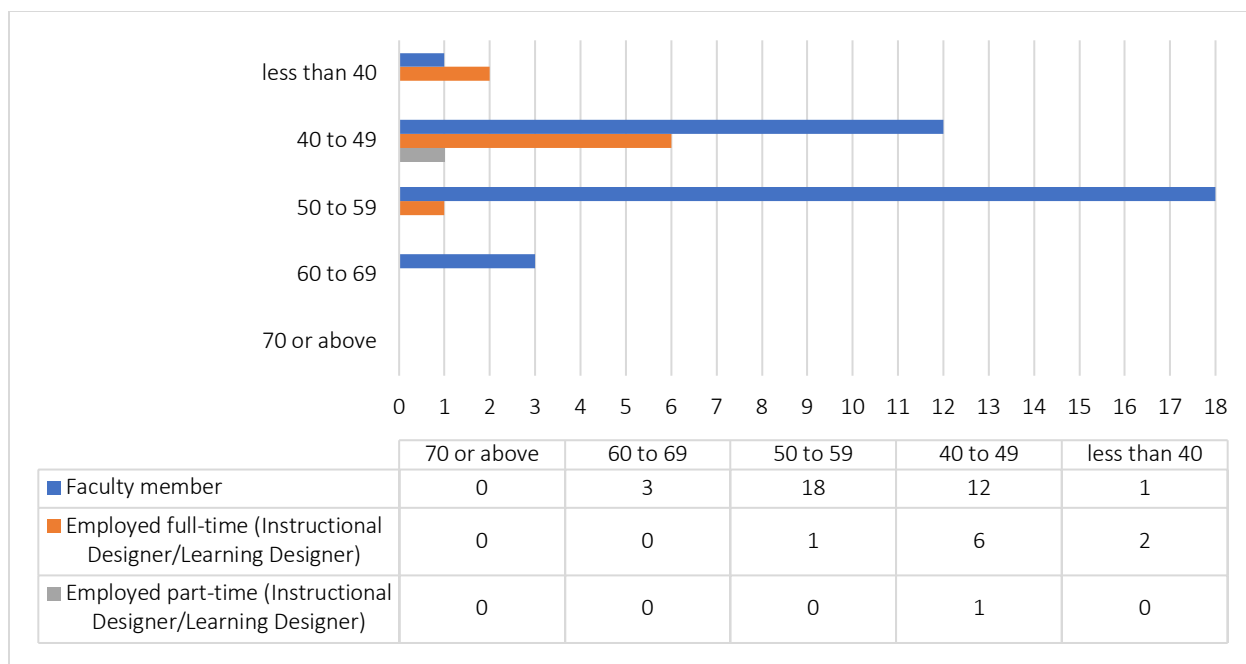


Figure 11. Experts' work status along with their age

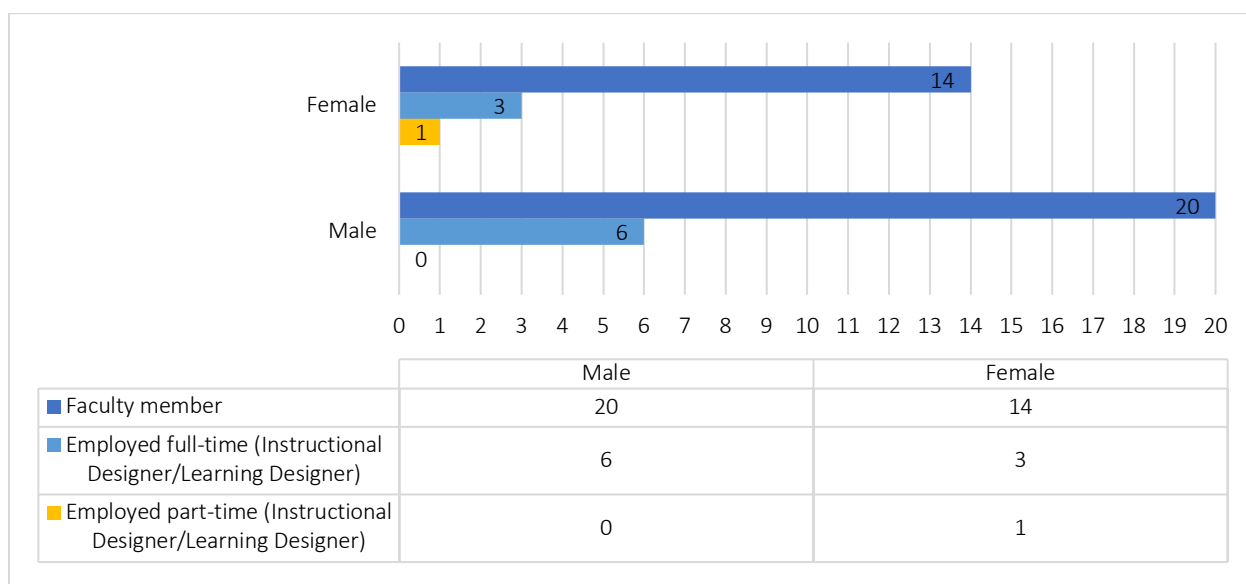
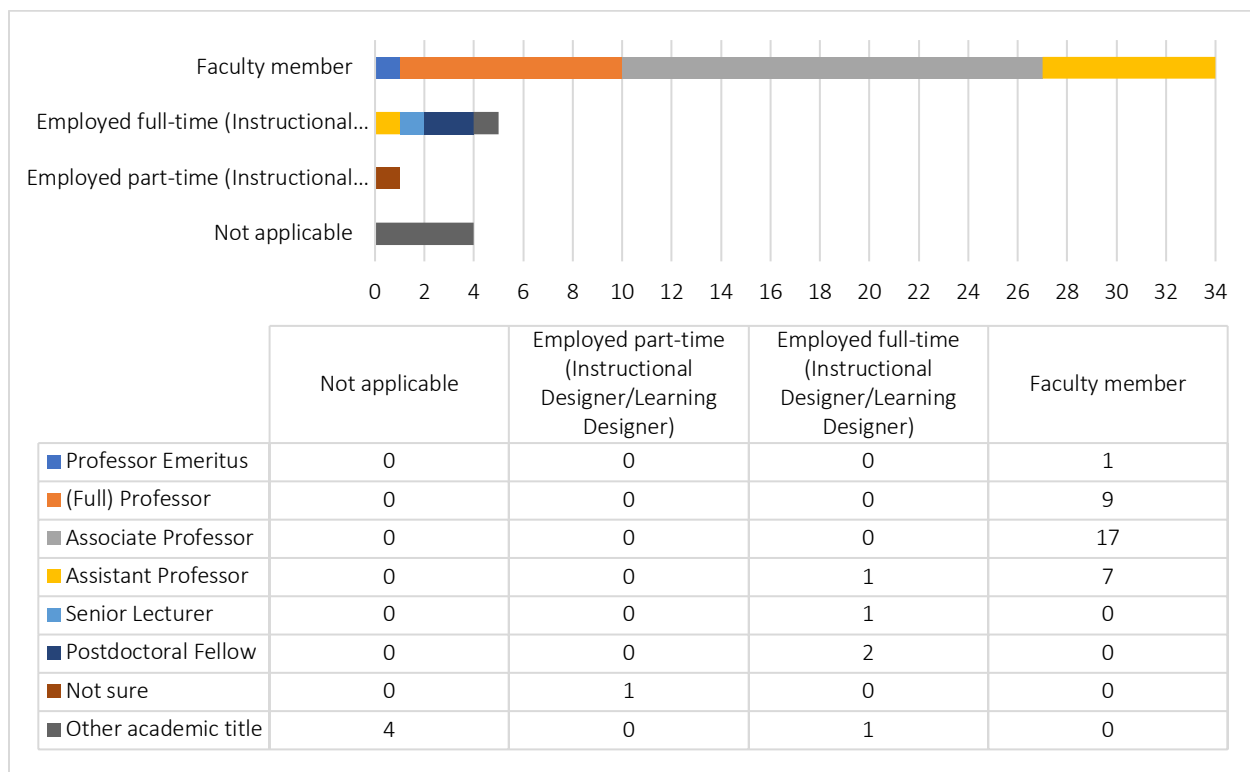


Figure 12. Expert's work status along with their gender

The question about the current situation of employment was among the critical questions in this questionnaire, ensuring that experts who were relevant to the subject of study, especially those working in the field of instructional design, were included. The value of this question was demonstrated after examining a response that confirmed the participant worked in a field far

removed from instructional design and has almost non-existent experience in the field of instructional design. This participant was removed from the process as a non-expert.

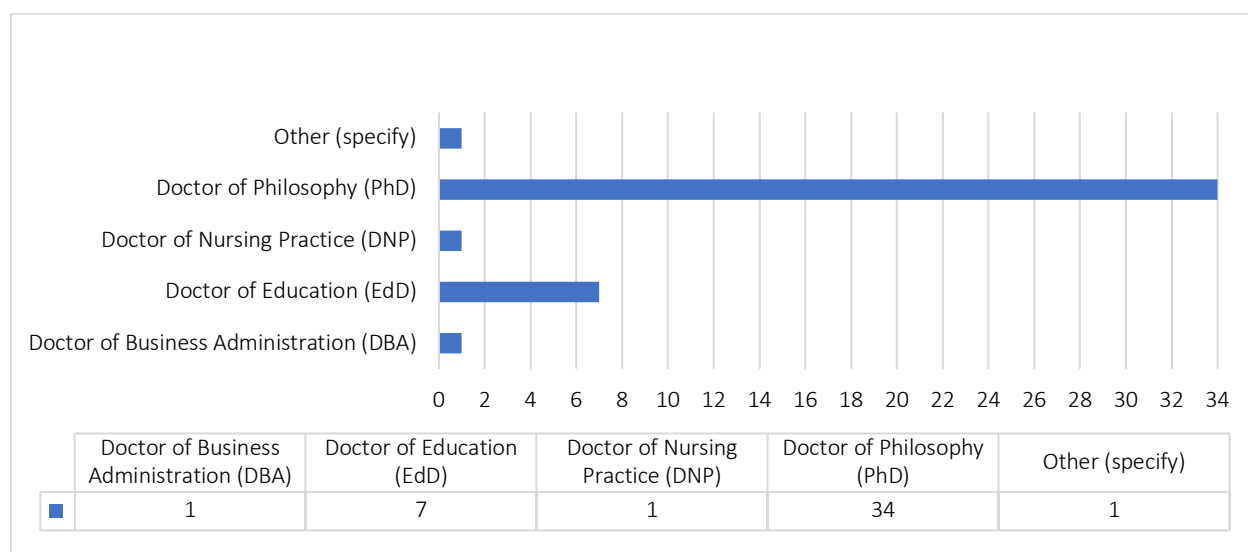
As shown in Figure 13, of the 44 participants who completed the demographic questionnaire, 34 were faculty members, 6 were non-faculty ID employees, one of whom was a part-time worker. Further, one of the participants identified work as non-academic, meaning that it does not apply to one of the options shown in the list. This individual provided an alternative work title as educational developer in a government-affiliated center. Four persons selected an option (not applicable) and did not share their work title.



*Figure 13. Experts' current status along with their job title*

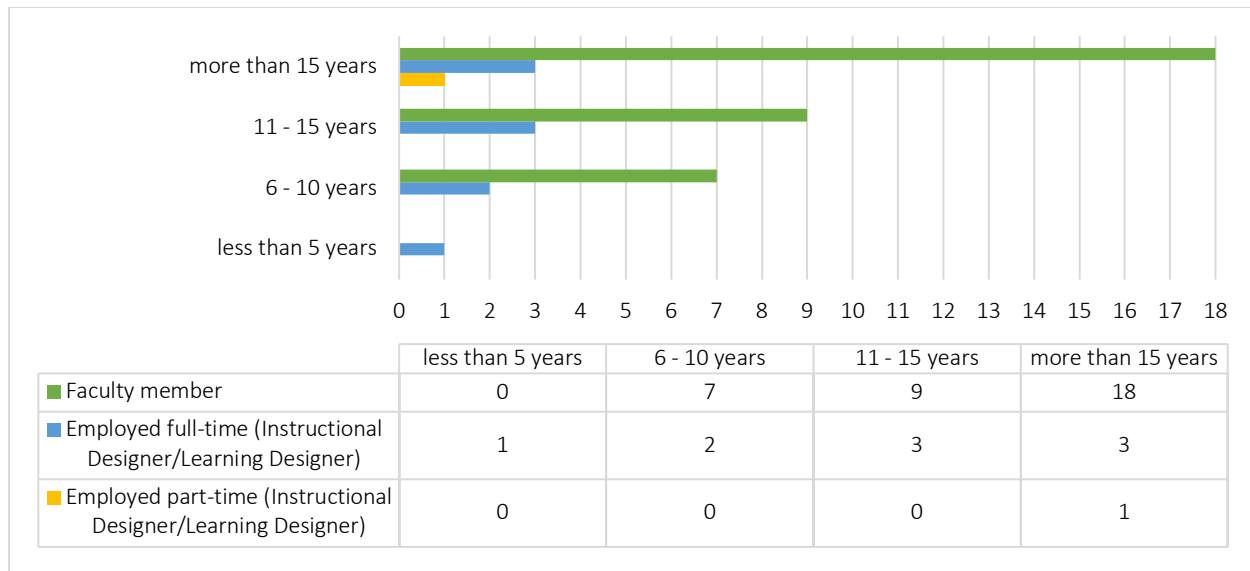
The experts' academic degrees varied, as shown in Figure 14. A majority hold a doctorate of philosophy. This result, in particular, constituted a substantial factor in the qualities of the experts, which are discussed in detail in Chapter 6.

Academic degrees of the experts varied, as shown in Figure 14, with 34 holding a doctorate in philosophy and 7 holding practice specific doctorates (1 Business administration, 7 education, 1 nursing), and 1 who did not specify the type of doctorate. However, among the results, a person with a Master of Arts degree in Digital Arts and Sciences appeared and was excluded. Details of this are given in Figure 11. A letter of thanks was sent to excluding person explaining exclusion criteria in a friendly manner.



*Figure 14. Academic degrees for the experts who completed the demographic background questionnaire*





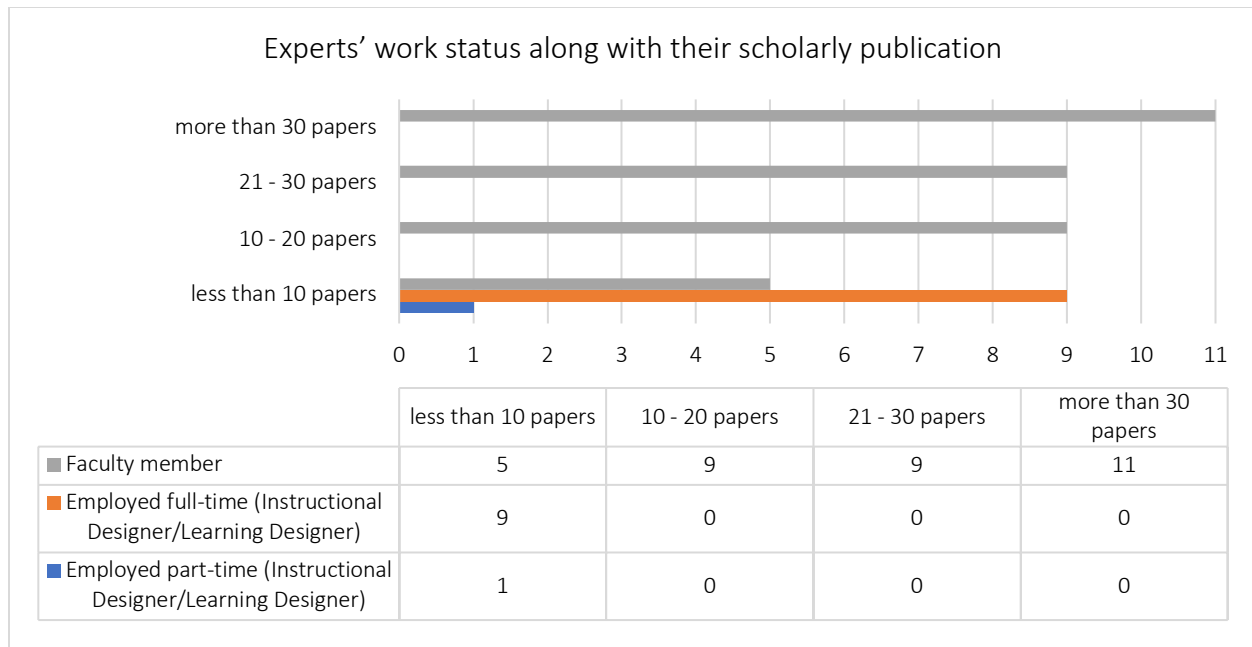
*Figure 15. Experts' experience in instructional design along with work status*

Figure 15, also shows one of the criteria that was used to select experts, which is the number of years of experience in the field of instructional design. As it appears in this figure, a total of 22 participants had more than 15 years, 12 had between 11 and 15 years, 9 had between 6 and 10 years, with only 1 having less than 6 years of experience in the field of instructional design. Given literature on expertise, these data suggest the sample includes an adequate level of expertise.



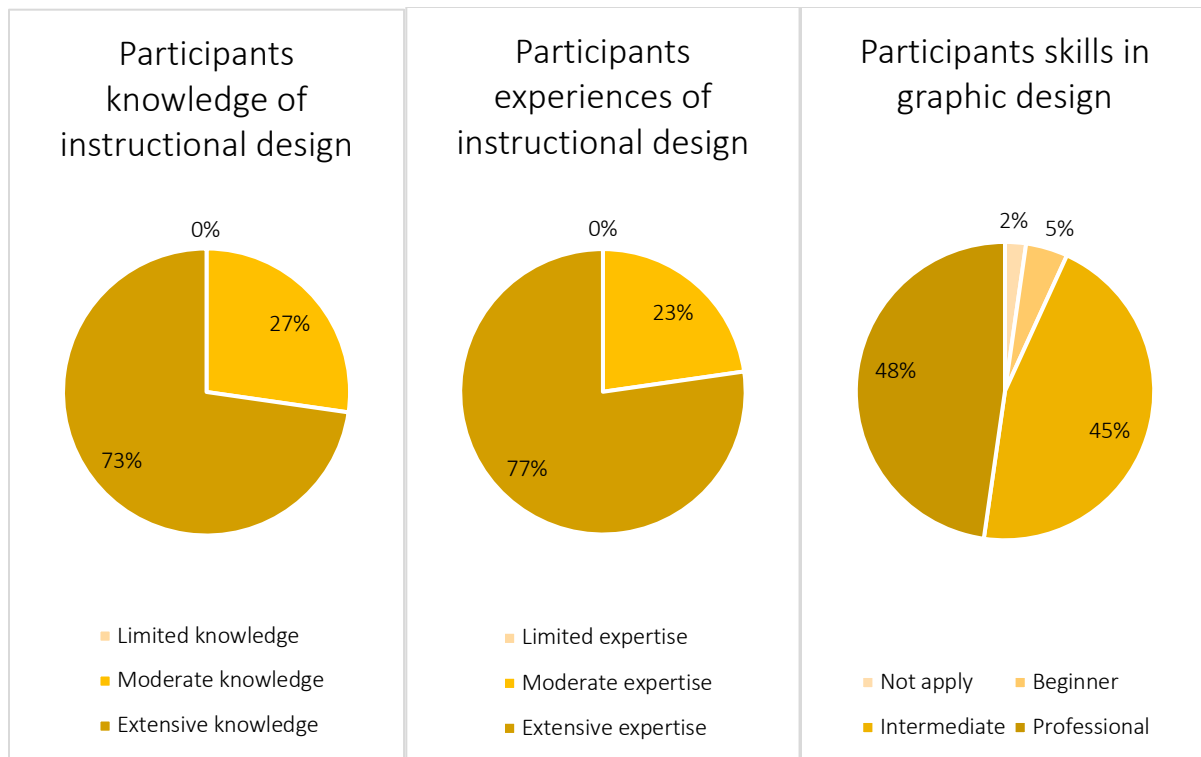
*Figure 16. Areas in which the experts worked*

Figure 16 shows the fields in which participants are working or had previously worked. Moreover, based on the results presented, working in the higher education field had the largest share, as the number of experts who worked in higher education reached 35 people. In contrast, Languages and Translation, as well as Sport Sciences and Physical Activity were the experts' smallest areas by frequency. In this particular question, participants were able to select more than one option to allow the investigator to learn more about the participants' experiences in specialty areas. These data shown in Fig. 16 came as a result of answering the fifth question in the questionnaire: "In which of the following areas did you work? - Please select all that apply."



*Figure 17 Experts' work status along with their scholarly publication*

Scholarly publishing was one of the criteria used to identify the experts in this study. Figure 17 shows that 11 experts have published more than 30 papers, 18 have published between 10 and 30 papers, with 15 publishing less than 10 papers, one only publishing 1 paper. The one person who published only one paper was excluded.


























*Figure 18. Participants' knowledge and experiences in instructional design, and their graphic design skills*

Figure 18 shows the results of the last three questions in the Demographic Information and Research Background Questionnaire. The results of these questions showed that 73% of the participants reported a high knowledge while 27% reported a moderate knowledge in instructional design. In contrast, none reported a limited knowledge of instructional design. The data on self-rated knowledge of ID helped increase the expert sample's quality by identifying one potential participant who was lacking the required knowledge; that person was removed from the participant list. Regarding question No. 11 about experience in instructional design, 77% specified high levels of experience, while 23% specified moderate experience. None specified limited experience. The last question in this survey was about the skills of the participants in graphic design. The results showed that 48% reported high skills, 45% reported intermediate skills, 5% specified simple skills,

and 2% determined that skill level was not applicable. This one respondent (representing the 2%), was removed from the list of participants.





















Figure 19 shows a comprehensive summary of the 43 experts who participated in the three Delphi rounds, including their gender, age, work status, academic degree, years of experience in instructional design, and level of self-assessment towards instructional design and graphics.

#	Gender	Age	Work status	Edu degree	Years of ID experience	Self-assessment on			Delphi participation		
						ID knowledge 1	ID experience	Graphic skills	R1	R2	R3
1		50 to 59	Faculty	PhD	15 +	Extensive	Extensive	Intermediate	✓		
5		40 to 49	Emp FT <sup>2</sup>	EdD	6-10	Extensive	Extensive	Professional	✓		
41		40 to 49	Emp FT	PhD	15 +	Extensive	Extensive	Professional	✓		
42		50 to 59	Faculty	PhD	15 +	Moderate	Extensive	Intermediate	✓		
33		50 to 59	Faculty	PhD	15 +	Extensive	Extensive	Intermediate	✓		
43		50 to 59	Faculty	EdD	15 +	Moderate	Moderate	Intermediate	✓		
13		50 to 59	Faculty	PhD	6-10	Extensive	Moderate	Intermediate	✓		
38		40 to 49	Faculty	PhD	6-10	Extensive	Extensive	Professional	✓		
21		40 to 49	Faculty	PhD	11-15	Extensive	Extensive	Professional	✓		
34		40 to 49	Faculty	PhD	6-10	Extensive	Extensive	Professional	✓		
35		60 to 69	Faculty	PhD	11-15	Extensive	Moderate	Intermediate	✓		
44		50 to 59	Faculty	EdD	15 +	Extensive	Extensive	Intermediate	✓		
9		50 to 59	Faculty	DBA	15 +	Moderate	Moderate	Beginner	✓		
17		50 to 59	Faculty	PhD	15 +	Extensive	Extensive	Intermediate	✓		
18		less than 40	Faculty	EdD	11-15	Extensive	Extensive	Intermediate	✓	✓	
6		50 to 59	Faculty	PhD	15 +	Moderate	Moderate	Intermediate	✓	✓	
7		40 to 49	Emp FT	PhD	15 +	Extensive	Extensive	Professional	✓	✓	
19		40 to 49	Faculty	PhD	11-15	Extensive	Extensive	Intermediate	✓	✓	
23		50 to 59	Faculty	PhD	15 +	Extensive	Extensive	Professional	✓	✓	
24		40 to 49	Faculty	PhD	6-10	Moderate	Moderate	Not apply	✓	✓	
2		40 to 49	Emp FT	PhD	11-15	Extensive	Extensive	Professional	✓	✓	
3		40 to 49	Faculty	PhD	6-10	Moderate	Moderate	Professional	✓	✓	
20		40 to 49	Emp PT <sup>3</sup>	EdD	15 +	Extensive	Extensive	Professional	✓	✓	

<sup>1</sup> “ID” represents Instructional Design.

<sup>2</sup> “Emp FT” represents Employed full-time (Instructional Designer/Learning Designer)

<sup>3</sup> “Emp PT” represents Employed part-time (Instructional Designer/Learning Designer)

#	Gender	Age	Work status	Edu degree	Years of ID experience	Self-assessment on			Delphi participation		
						ID knowledge 1	ID experience	Graphic skills	R1	R2	R3
27		40 to 49	Emp FT	PhD	6-10	Extensive	Extensive	Intermediate	✓	✓	
32		50 to 59	Faculty	PhD	11-15	Moderate	Moderate	Intermediate	✓	✓	
37		40 to 49	Faculty	PhD	11-15	Extensive	Extensive	Professional	✓	✓	✓
39		50 to 59	Faculty	PhD	15 +	Moderate	Extensive	Intermediate	✓	✓	✓
22		50 to 59	Faculty	PhD	11-15	Extensive	Extensive	Professional	✓	✓	✓
36		40 to 49	Emp FT	DNP	11-15	Extensive	Extensive	Professional	✓	✓	✓
15		60 to 69	Faculty	EdD	15 +	Extensive	Moderate	Intermediate	✓	✓	✓
26		40 to 49	Faculty	PhD	6-10	Extensive	Moderate	Not apply	✓	✓	✓
10		40 to 49	Faculty	EdD	15 +	Extensive	Extensive	Intermediate	✓	✓	✓
11		50 to 59	Faculty	PhD	15 +	Extensive	Extensive	Intermediate	✓	✓	✓
12		less than 40	Emp FT	PhD	11-15	Moderate	Extensive	Beginner	✓	✓	✓
14		50 to 59	Faculty	PhD	15 +	Extensive	Extensive	Professional	✓	✓	✓
31		50 to 59	Faculty	PhD	15 +	Extensive	Extensive	Professional	✓	✓	✓
16		60 to 69	Faculty	PhD	15 +	Extensive	Extensive	Intermediate	✓	✓	✓
28		50 to 59	Emp FT	PhD	15 +	Extensive	Extensive	Professional	✓	✓	✓
29		50 to 59	Faculty	PhD	15 +	Extensive	Extensive	Professional	✓	✓	✓
8		50 to 59	Faculty	PhD	15 +	Extensive	Extensive	Professional	✓	✓	✓
30		40 to 49	Faculty	PhD	6-10	Extensive	Extensive	Professional	✓	✓	✓
40		40 to 49	Faculty	PhD	11-15	Extensive	Extensive	Professional	✓	✓	✓
25		40 to 49	Faculty	PhD	11-15	Extensive	Moderate	Intermediate	✓	✓	✓







	Round 1		Round 2		Round 3		Tota	43	29	18
Total	 F=17	 M=26	 F=12	 M=17	 F=8	 M=10				

Figure 19. A comprehensive matrix of the number of experts on Delphi rounds and their demographics and experiences

The data obtained from the demographic and research background questionnaire was one of the methodological pillars of this study. It provided the first building block for the Delphi round through a systematic examination of the instructional design experts' characteristics and individual experiences. Thus, the end of the expert analysis was the beginning of the first round of Delphi presented in this next section.

**Results of the first and second round of Delphi responding to the first research question:**

- *To what extent do instructional design experts agree that the multimedia learning principles were used in the 3Ps advance organizer?*

The objective of the Delphi was to provide a structure approach where experts responded to questions and reached consensus on the use of multimedia learning principles in 3Ps AO. The first round contained 43 closed questions about the design of the 3Ps AO. The experts' answers to these questions were analyzed to extract areas of agreement, or consensus, on the effective inclusion of multimedia principles in the 3Ps AO. These first-round data were used to determine what kinds of modifications were required in the 3Ps AO to make it more compliant with multimedia learning principles. The next section explains the rules used to determine consensus points.

Green, (2014), Linstone and Turoff, (2002), Rayens & Hahn (2000), and von der Gracht (2012) suggested that consensus is one of the most controversial components of the Delphi techniques. Researchers have disagreed widely on its measurement, for example, Jason and David (2016), stressed that it was difficult to strictly achieve compatibility standards in a Delphi if both quantitative and qualitative data are extracted together, as is the case in this study, because the nature of these data is different. von der Gracht (2012) however suggested a list of subjective criteria and descriptive statistics that can be used to determine consensus by calculating a consensus score. This method has been used by many researchers. One of the most prominent tools used to determine consensus mentioned by von der Gracht (2012) is the interquartile range (IQR) criterion. IQR was endorsed by Murphy et al. (1998) to reach a consensus as characterized by consensus strictness equaling 2 or less; dispersed, or absence of, consensus, equaling 3.

In this study, to ensure rigor, three generally accepted techniques were used to identify the level of expert opinion consensus on the use of multimedia learning principles in the 3Ps AO:

- **Certain level of agreement (Percentile values):** consensus on the use of multimedia learning principles was considered “High extent” when at least 75% of respondents reached an agreement. “Moderate extent” consensus required 60% to 74% of respondents to agree on the questionnaire's items. The absence of consensus was identified when 59% or less of respondents agreed with individual items.
- **The interquartile range (IQR):** used to calculate the strength of the consensus. IQR is the absolute value of the difference between the 75th and 25th percentiles, with smaller values indicating higher degrees of consensus. The interquartile range of 2 or less specifies a strong group consensus, and 3 indicates dispersed responses. Accordingly, a consensus is reached by instructional design experts on the use of multimedia learning principles when IQR is 2 or less on a 5 or 7-point Likert scale. Interquartile ranges (IQRs) were calculated for the experts’ responses to each question. The “level of agreement or disagreement” achieved was measured.
- **Consensus stability:** after conducting the previous analysis, the experts' responses in the first round were compared to responses in the second round to analyze consistency of opinions across both rounds. At the time, stable answers in the two rounds were an indication of a strong consensus. However, if responses changed between the two rounds the direction of change in the new rounds, whether positive (higher agreement) or negative (lower agreement), is considered as part of the consensus rating. Thus the combines the factor of level of agreement, consensus



and stability to add more rigor to the consensus identification as posited by Dajani et al. (1979).

Statistical analyses for Delphi measurements were performed using SPSS Version 27.

The questionnaire used in the Delphi was divided into eight sections, see Appendix 8:

- In the first section, experts received information regarding the project, instructions, FAQs, and a visual overview of the 3Ps AO, from a bird's eye view.
- In the second section through the sixth section of the questionnaire, experts were asked to review each of the five parts of the 3Ps AO separately. The first part of each section included learning objectives reflecting desired outcomes for 3Ps AO end users. The experts were asked to rate each part of AO for its relevance to six multimedia learning principles using a six-part Likert scale (High extent, Moderate extent, Fair extent, Low extent, Not at all, and I am not sure). The multimedia learning principles queried included: Coherence, Signaling, Spatial Contiguity, Modality, Multimedia, and Personalization. All questions required an answer to move onto the next. Experts also had a option to justify Likert's answer in an open text box. Experts were also able to add additional unlisted multimedia learning principle if they believe it was missing in the prompts and related to the AO. there were six questions in each of the five sections totaling 30 questions about the multimedia principles incorporated into the 3Ps AO.
- In Section 7, the experts were asked to evaluate the AO in general in terms of cognitive load processing (see Table 3. Mayer's 12 Principles of Multimedia Learning, for addressing the cognitive load process by implementing principles of multimedia learning). Likert's scale is composed of seven points, ranging from

Strongly Agree to Strongly Disagree. Likert scale was used to give an expert opinion on the extent of:

- The multimedia learning principles used in AO contributing to *reducing extraneous processing*.
- The multimedia learning principles used in AO contributing to *managing essential processing*.
- The multimedia learning principles used in AO contributing to *increasing germane processing*.
- In Section 8, experts assessed the overall use of graphic design elements and principles in the AO. These ten elements and principles were rated on a four-point Likert scale (from High Extent to Not at All), with an optional open-ended response box to justify ratings. The ten graphic design elements and principles included were: Contrast, Repetition, Alignment, Proximity, Color, Typography, Hierarchy, Balance, Space, Direction. Experts were also able to add other unlisted design elements or principles.

Figure 20 shows the initial version of the 3Ps AO presented to experts during the First Delphi round.

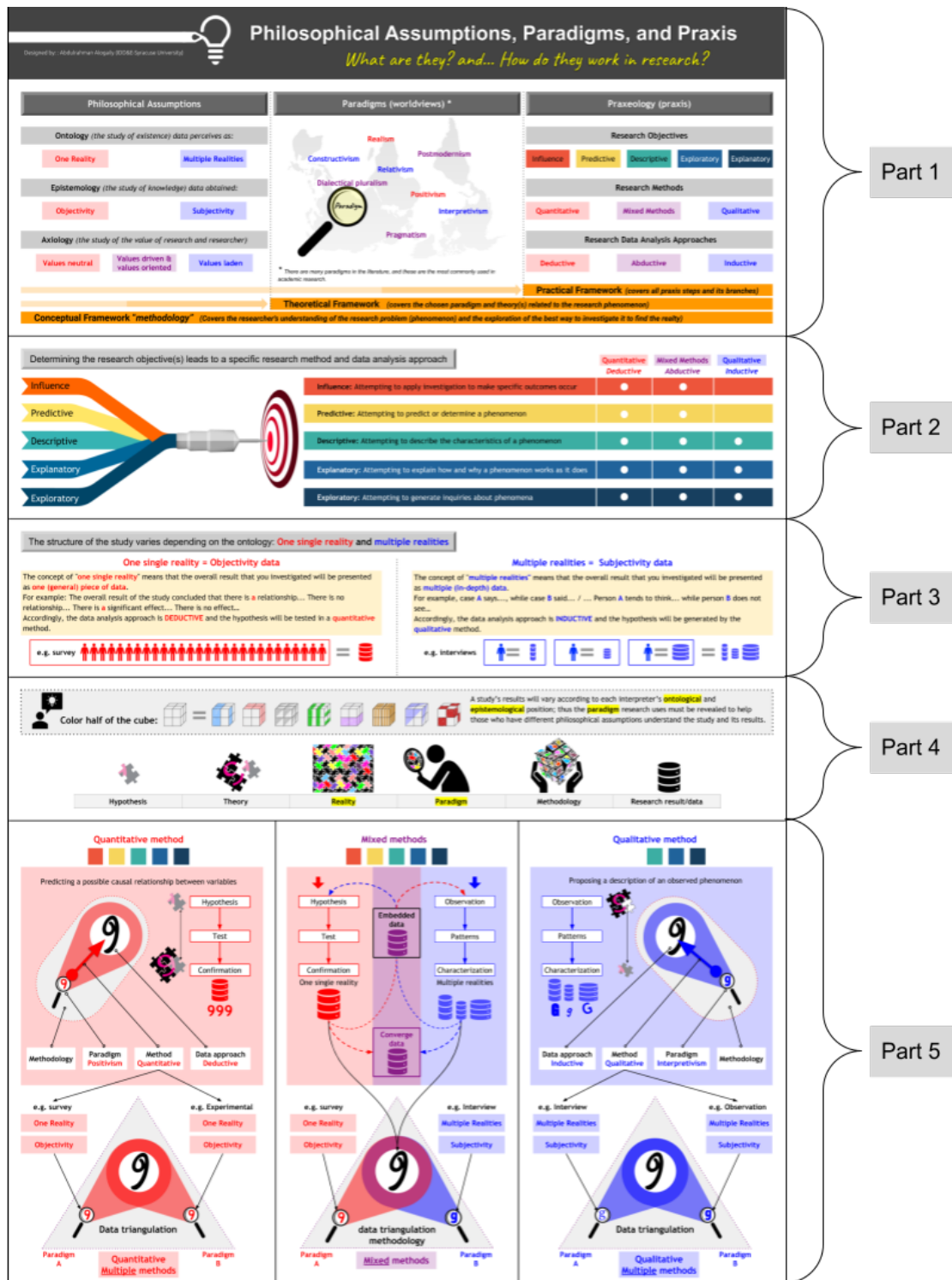
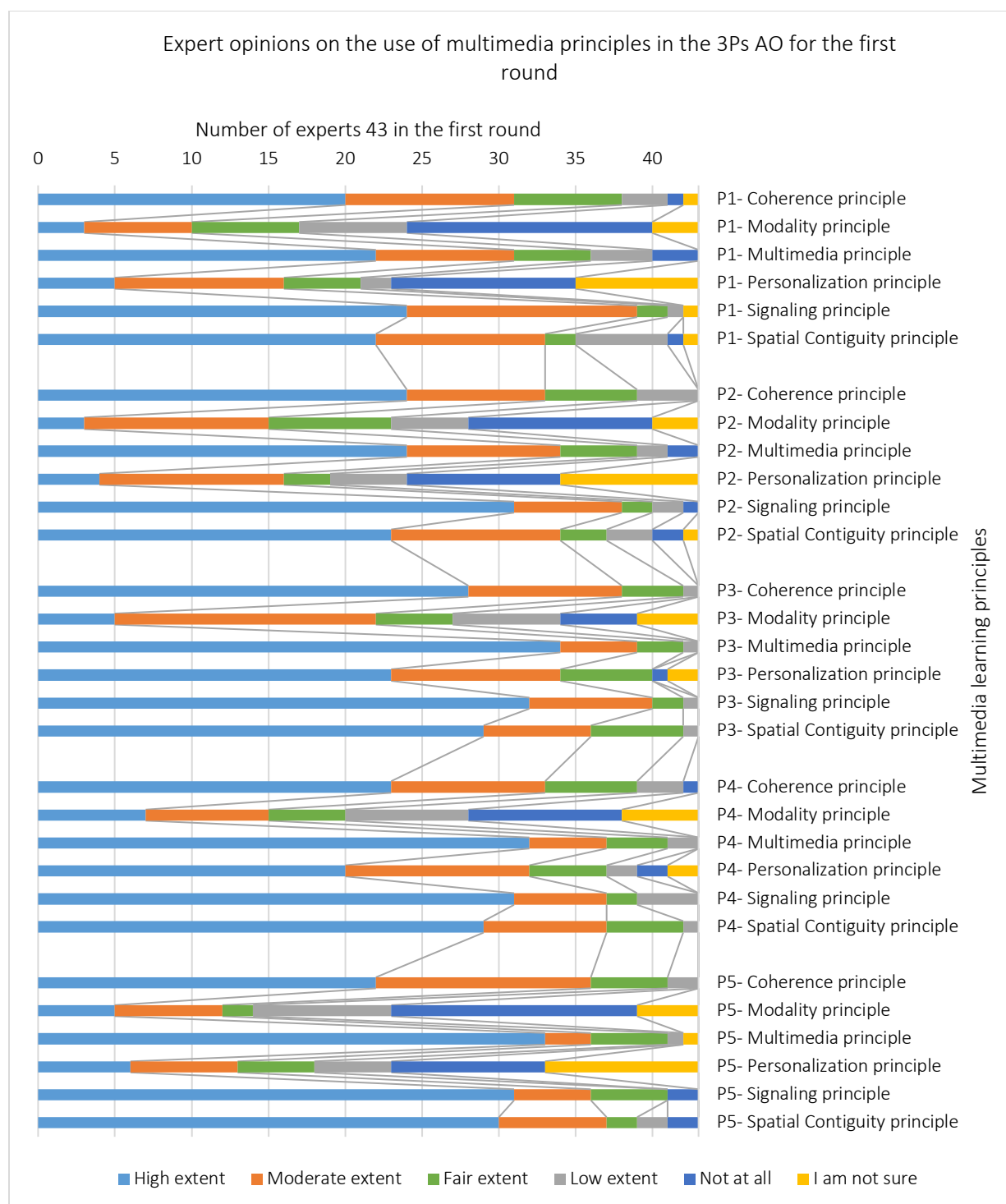


Figure 20. The 3Ps AO presented to experts in the first round of Delphi



*Figure 21. Expert opinion on the extent to which the multimedia learning principles are used in the 3Ps AO in the first round of Delphi*

Figure 21 shows 43 experts' opinions on each question of the five parts of the 3Ps AO.

Table 10 provides the results of expert opinions, showing the IQR for each principle in each part

of the AO. In the first part of the AO—based on a 75th percentile and the interquartile range (IQR, the absolute value of the difference between the 75th and 25th percentiles: smaller values indicate higher degree of consensus)—there was a high degree of implementation of the Signaling and Spatial Contiguity principles of multimedia design. When describing experts; opinions regarding Signaling and Spatial Contiguity, they wrote about the use of highlighting. The experts ranked the Modality and Personalization principle lowest in terms of the implementation in the AO. Many of them commented that the reason for this is that this part does not contain any narration.

In the second part of the AO, 75% of experts believed that coherence, signaling, spatial contiguity, and multimedia principles were implemented moderately well. Experts also ranked the principle of Modality and Personalization as not being used again in this part, and they provided the same reasons that they mentioned in the first part.

Opinions provided in the third part of the AO, suggested that all of the principles were implemented at least moderately well, with one the multimedia principle, being implemented to a high extent.

In part four, the expert opinions showed that all principles had been implemented to a moderate extent, except for two principles, the Modality principle and the Personalization principle. These two principals were rated as being implemented to a fair extent. Based on written feedback, there was no narration or conversational style in this section.

Finally, in the fifth part of the AO, the experts suggested the modality principle was implemented to a low extent. Based on feedback, this was because there is a low degree of narration in this particular section. The personalization principle was not implemented at all. The other tested principles were assessed as being implemented to a moderate extent.

Table 10. Statistical results of expert opinion on the use of multimedia learning principles of the 3Ps AO in the first round of Delphi

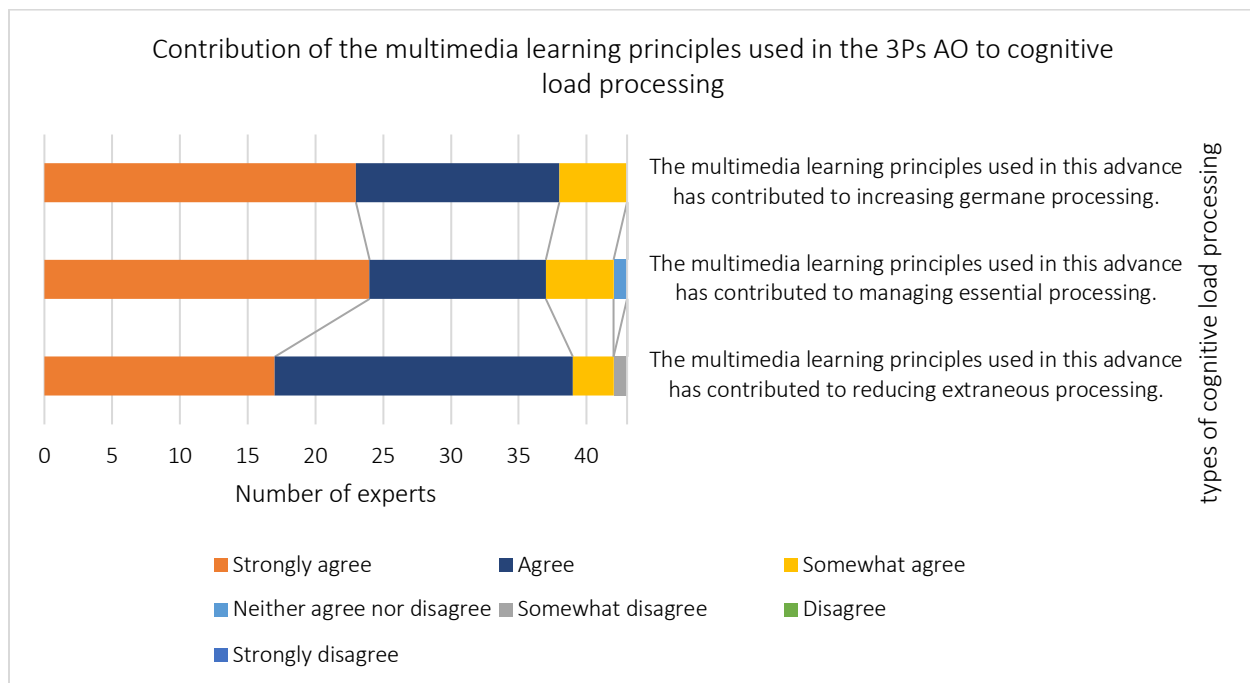
Multimedia Learning Principles						
	Coherence	Signaling	Spatial Contiguity	Modality	Multimedia	Personalization
# of experts	43	43	43	43	43	43
<b>Part 1</b>						
Consensus at 75%	Fair extent	Moderate extent	Moderate extent	Not at all	Fair extent	Not at all
IQR*	2	1	1	3	2	3
<b>Part 2</b>						
Consensus at 75%	Moderate extent	Moderate extent	Moderate extent	Not at all	Moderate extent	Not at all
IQR	1	1	1	3	1	3
<b>Part 3</b>						
Consensus at 75%	Moderate extent	Moderate extent	Moderate extent	Moderate extent	High extent	Moderate extent
IQR*	1	1	1	1	0	1
<b>Part 4</b>						
Consensus at 75%	Moderate extent	Moderate extent	Moderate extent	Fair extent	Moderate extent	Fair extent
IQR*	1	1	1	2	1	2
<b>Part 5</b>						
Consensus at 75%	Moderate extent	Moderate extent	Moderate extent	Low extent	High extent	Not at all
IQR*	1	1	1	3	0	3

\*IQR: 2 or less = strong group consensus, 3 and more indicates dispersed responses.

In the seventh section, the experts assessed how cognitive load processing was impacted by the AO's implementation of the multimedia learning principles. They were asked,

“Please provide your opinion on the extent to which the multimedia learning principles used in the advance organizer contribute to extraneous, essential, and germane processing by responding to the following statements...

Note that: extraneous processing refers to cognitive processing that does not support the instructional objectives and is caused by poor instructional design, essential processing refers to cognitive processing aimed at mentally representing the presented material in working memory and is caused by the material's complexity, and generative processing refers to cognitive processing to make sense of the presented material and is caused by the learner's motivation to learn.”



*Figure 22. Expert opinion on the contribution of the multimedia principles used in the first version of the 3Ps AO to addressing the cognitive load.*

Figure 22 shows the experts’ opinion on the contribution of the multimedia learning principles used in the 3Ps AO to cognitive load processing. An IQR of two or less specified a strong group consensus. A strong consensus was achieved ( $IQR = 1$ ) amongst experts on all three measurements: reduction of extraneous processing, managing of essential processing, and increasing of germane processing.

*Table 11. Statistical results of expert opinion on the contribution of the multimedia principles used in the first version of the 3Ps AO to addressing the cognitive load*

	The multimedia learning principles used in the 3Ps have contributed to reducing extraneous processing.	The multimedia learning principles used in the 3Ps have contributed to managing essential processing.	The multimedia learning principles used in the 3Ps have contributed to increasing germane processing.
# of experts	43	43	43
Consensus at 75%	Agree	Agree	Agree
IQR*	1	1	1

*\*IQR: 2 or less = strong group consensus, 3 and more indicates dispersed responses.*

In addition to the above data, expert opinions about the use of graphic design elements and principles in this AO were also gathered. These data suggested that there was a strong relationship between the multimedia learning principles and the graphic design elements and principles. Table 12 shows the experts' opinion on the use of ten graphics design elements and principles in the AO. An IQR of two or less specified a strong group consensus. A strong consensus was achieved (IQR = 1) amongst experts on all ten elements and principles, with Contrast, Proximity, Space, and Direction achieving a strong consensus, IQR = 1, and Repetition, Alignment, Color, Typography, Hierarchy, and Balance achieving an even stronger consensus, IQR = 0.



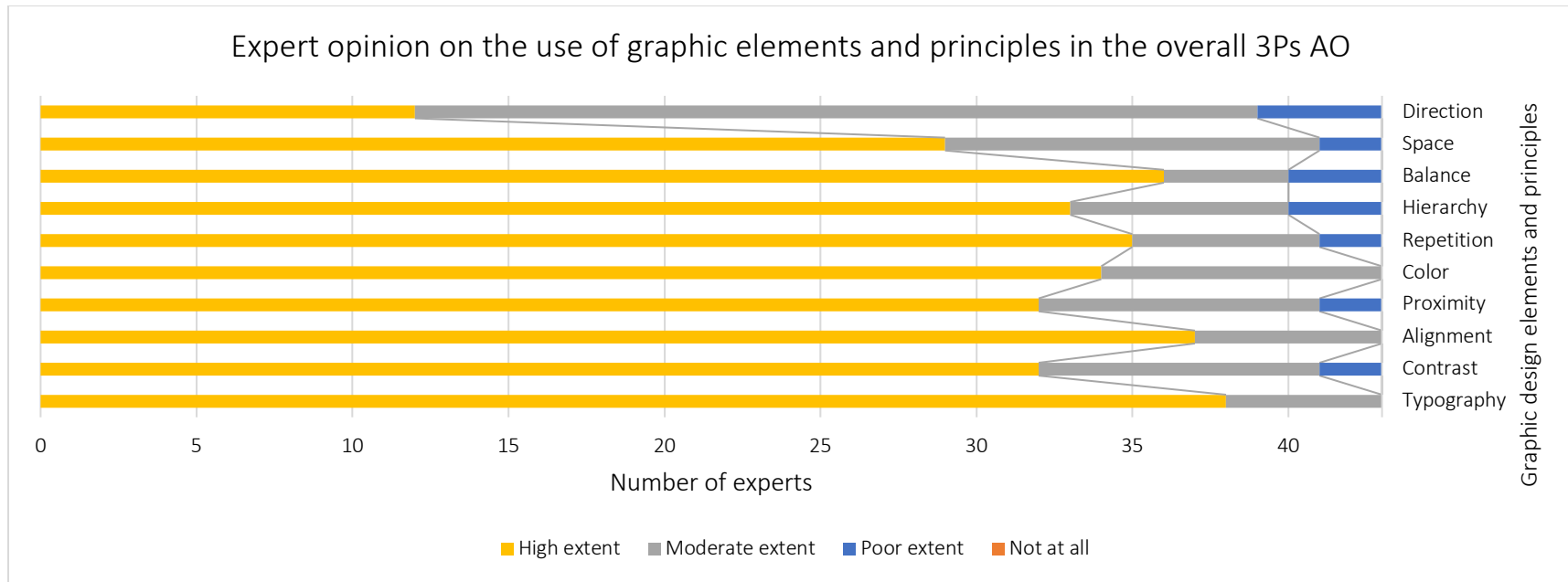


Figure 23. Expert opinion on the use of graphic elements and principles in the overall 3Ps AO in the first round of Delphi

Table 12. Statistical results of expert opinion on the use of graphic elements and principles in the overall 3Ps AO in the first round of Delphi

	Contrast	Repetition	Alignment	Proximity	Color	Typography	Hierarchy	Balance	Space	Direction
# of experts	43	43	43	43	43	43	43	43	43	43
Consensus at 75%	Moderate extent	High extent	High extent	Moderate extent	High extent	High extent	High extent	High extent	Moderate extent	Moderate extent
IQR*	1	0	0	1	0	0	0	0	1	1

\*IQR: 2 or less = strong group consensus, 3 and more indicates dispersed responses.

## Adjustments made to the AO after the first round

Based on the data collected in the first round, whether quantitative or qualitative data, many adjustments were made to the AO, as follows:

### Part 1 of the AO (before and after the first round):

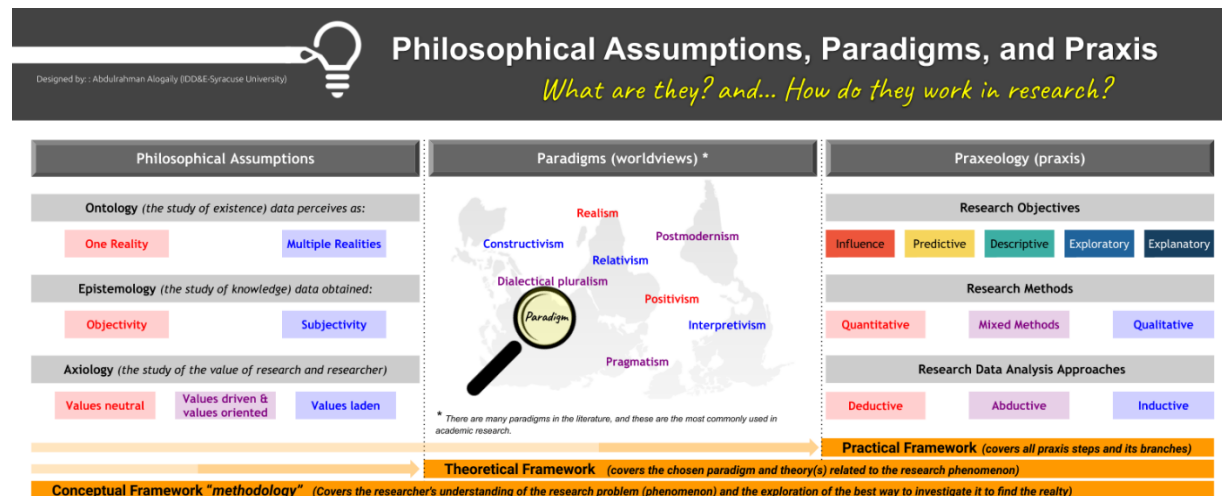


Figure 24. Part 1 of the AO before the expert review in the first round.

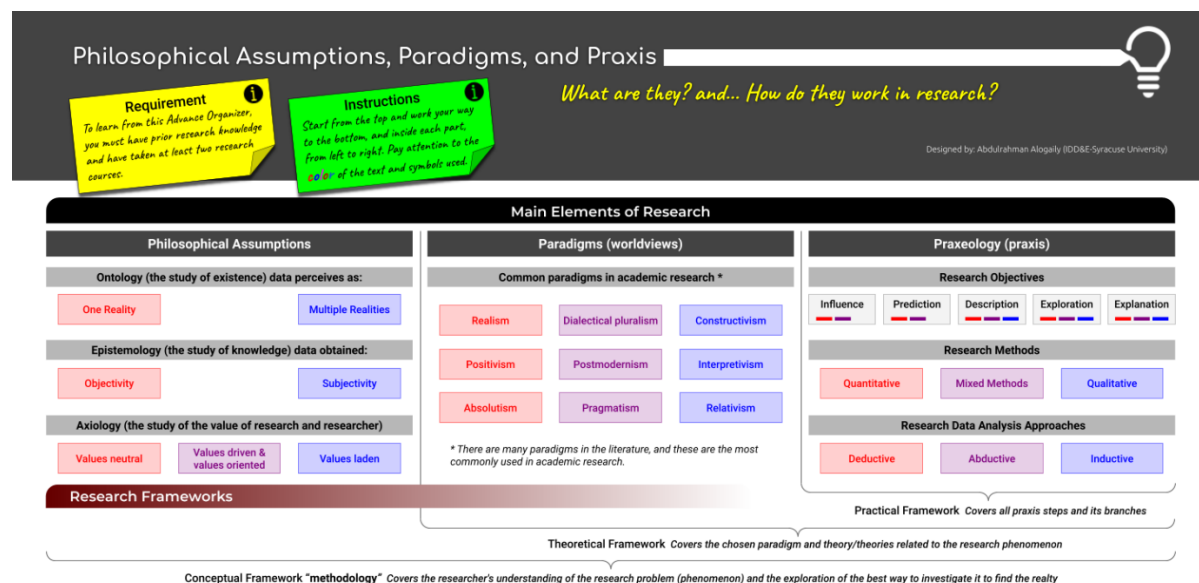


Figure 25. Part 1 of AO after addressing the comments of ID experts in the first round.

### Adjustments made for part 1 of the AO:

- Expanded the height of the title space to contain the requirement and instructions stickers.

- Items in the title space have been reorganized to be left-to-right alignment.
- Added a title to the first part.
- Recolored the background of the main title and subtitles to grayscale only, where the color had contained a slight shade of red.
- Removed the shadow/bevel that was in the subtitle boxes.
- Resized the subheading boxes and items in general.
- Reorganized all the elements to align with each other in both the vertical and horizontal direction.
- Replacing the dotted dividers with continuous lines between the three sections so that the line visually extends downwards to the framework's sections.
- The background colors of the research objectives boxes has been removed.
- A small rectangle has been added inside each research objectives box whose color indicates the color of the appropriate research method.
- Removed the map that was in the paradigms section background.
- Removed the lens that was in the paradigms section.
- The orange background of the frameworks at the bottom has been removed.
- The arrows in the frameworks section have been removed.
- Revised the framework's definitions.
- A subtitle was added to the frameworks.
- A dividing line has been added between parts of the AO.

**Part 2 of the AO (before and after the first round):**

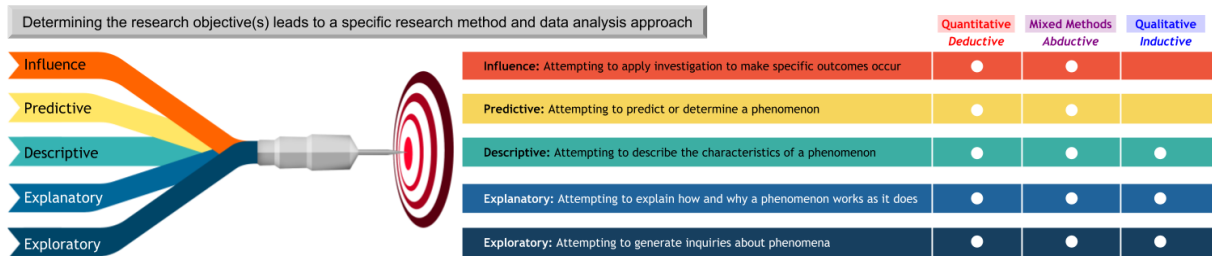


Figure 26. Part 2 of the AO before the expert review in the first round.

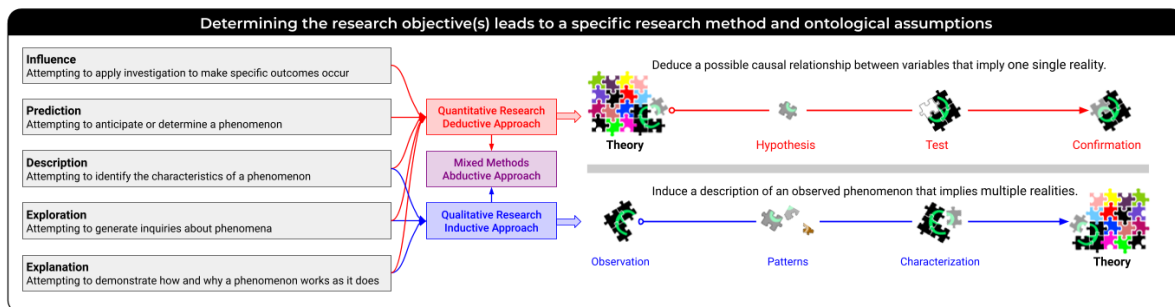


Figure 27. Part 2 of the AO after addressing the comments of ID experts in the first round.

### Adjustments made for part 2 of the AO:

- Centered the part title.
- Removed the shadow/bevel that was in the subtitle boxes.
- The graphic of the target and arrows has been removed.
- Added more graphical elements that explain the steps of the search methods.
- The background colors of the research objectives boxes has been removed.
- Removed the circular points on the right and replaced them with arrows that lead to an appropriate research method.
- Added a frame to the entire part.

### Part 3 of the AO (before and after the first round):

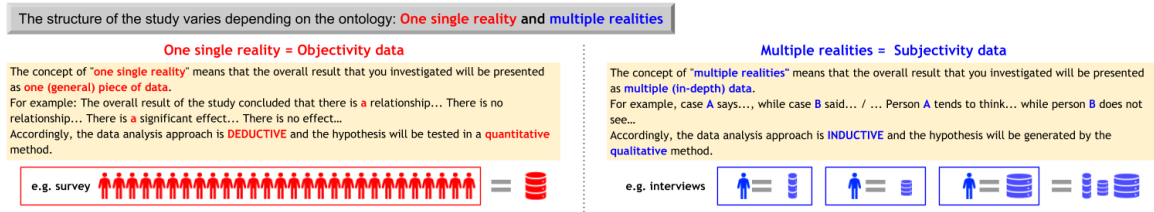


Figure 28. Part 3 of the AO before the expert review in the first round.

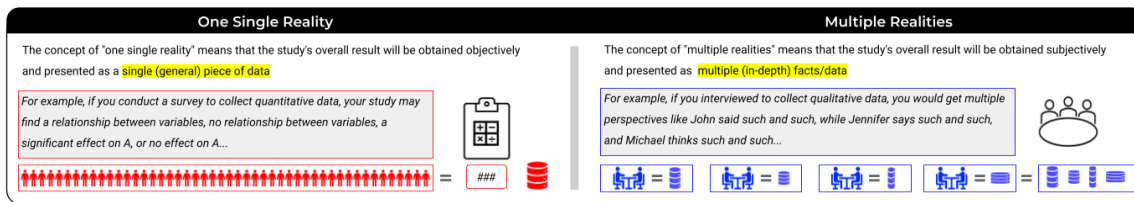


Figure 29. Part 3 of the AO after addressing the comments of ID experts in the first round.

#### Adjustments made for part 3 of the AO:

- Centered the part title.
- Removed the shadow/bevel that was in the subtitle boxes.
- The definition of terms has been separated from the examples.
- Highlighted the important terms and linked them with illustrations.
- Icon for surveys and interviews has been added.
- Some extraneous/repeated words has been removed.
- Added a frame to the entire part.

#### Part 4 of the AO (before and after the first round):



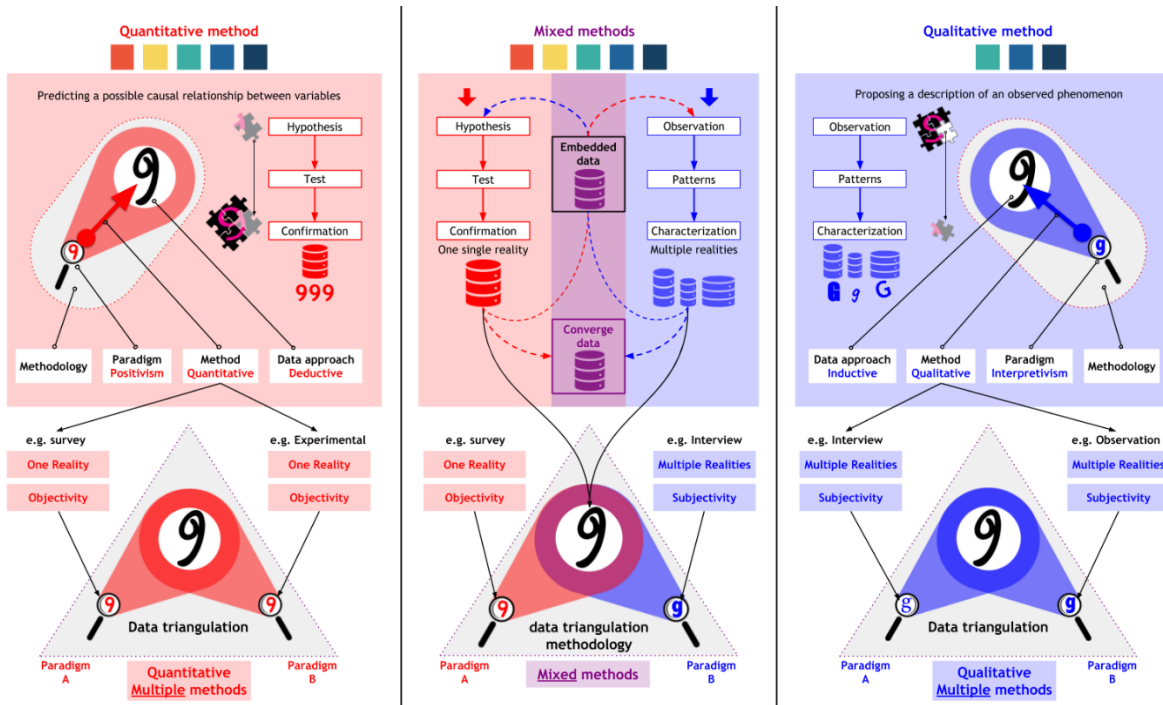


Figure 32. Part 5 of the AO before the expert review in the first round.

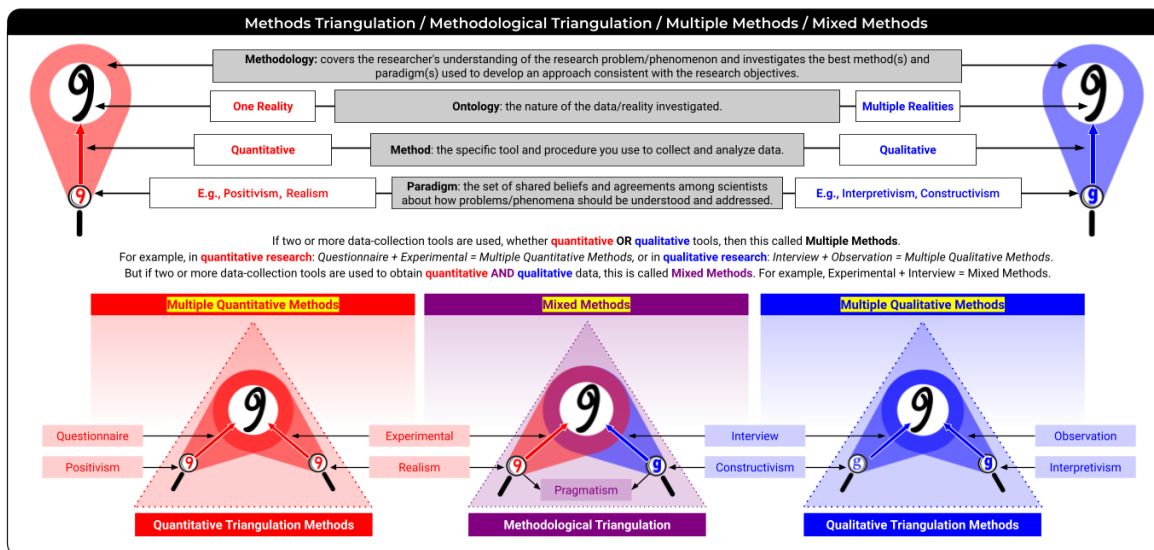


Figure 33. Part 5 of the AO after addressing the comments of ID experts in the first round.

### Adjustments made for part 5 of the AO:

- A title has been added to this part.

- This part was re-divided into one part, with subsections inside.
- Extraneous elements such as research methods icons and terms, curved arrows, mixed research method types are removed, as well as the capsule shape.
- Definitions of important terms have been added and supported by examples.
- Highlighted the important concepts.
- Important terms have been connected with shapes that visually clarify their meaning.

### **Summary of round one**

Comments made by instructional design experts on this round contributed to improving 3Ps AO; Although, there was no consensus by the experts in this round on using all multimedia learning principles in all the five parts of the AO. More specifically, there was consensus among experts on using coherence, signaling, spatial contiguity, and multimedia principle. On the other hand, there was a lack of consensus regarding using the principle of modality and personalization in part 1,2, and 5 of the AO. The most prominent justifications of some experts about the lack of using the principle of modality in the AO is the lack of narration. These experts assumed that the narrative in question here was the spoken rather than the written narrative. The researcher provided a detailed interpretation of that point in chapter six. As for the principle of personalization, the experts presented their justification that the AO texts were supposed to be in a conversational style instead of the formal one. The next section presents the experts' opinions after the revisions are made to the 3Ps AO.



### **The result of expert opinions on the use of multimedia learning principles in the 3Ps AO for the second round of Delphi**

Upon receiving the second round invitation, each expert received a personalized report provided a summary of all responses from round one and indicating their own responses to each question. This report reminded them of their review of the initial AO. All answers were anonymized to protect confidentiality.

The AO in this round was a revised version based on round one feedback. The same questionnaire was provided to the experts for round two, however, an additional multimedia learning principle—Segmenting—was added to the questionnaire, based on a recommendation from first round's responses.

There were 29 experts who agreed to participate in the second round from the original 43 who participated in the first round. Table 13 shows the second Delphi round results of expert opinion on each part of the AO, showing the IQR for each principle in each part.

The first part of the AO had a moderate extent of the principles of coherence, signaling, segmenting, and multimedia. Modality and personalization have a low extent of application. Experts provided similar feedback to the first round, on a lack of narration and conversational style in this part. In comparison to the first Delphi round, coherence increased from a fair extent to a moderate extent. Modality also increased, from IQR = 4 to IQR = 3. Multimedia increased from IQR = 2 to IQR = 1. However, spatial contiguity decreased, from IQR = 1, to IQR = 2. This was expected, because, as previously described, some graphics were removed from the first part of the AO, based on recommendations to reduce extraneous processing in Delphi round 1.

As for the second part of the AO, all of the multimedia learning principles had a strong consensus ( $IQR \leq 2$ ). Compared to the first Delphi round. All of multimedia learning principles' application increased.

In the third part of the AO, all of the principles were rated as very high consensus ( $IQR \leq 1$ ), with spatial contiguity and multimedia principles reaching  $IQR = 0$ , the highest level of consensus. This was an improvement compared to the first round of the Delphi.

Similarly, in the fourth part of the AO, each of the principles were rated as having a very high consensus ( $IQR \leq 1$ ). These were improvements over the first Delphi round as well. Most of the comments in the first round related to graphic elements that may have caused extraneous cognitive load. In the second design, the researcher modified graphic elements, like cubes and the four people around the table to address this comment.

In the fifth part of the AO, there was a very high consensus amongst the experts on each of the principles ( $IQR \leq 1$ ). Five categories were  $IQR = 1$ , and two were  $IQR = 0$ . Personalization changed from  $IQR = 3$  to  $IQR = 1$ . Many modifications, as mentioned previously, were done between rounds one and two in the fifth part based on expert feedback, such as the removal of directional lines to improve comprehension and the removal of elements that did not correspond to certain learning objectives.

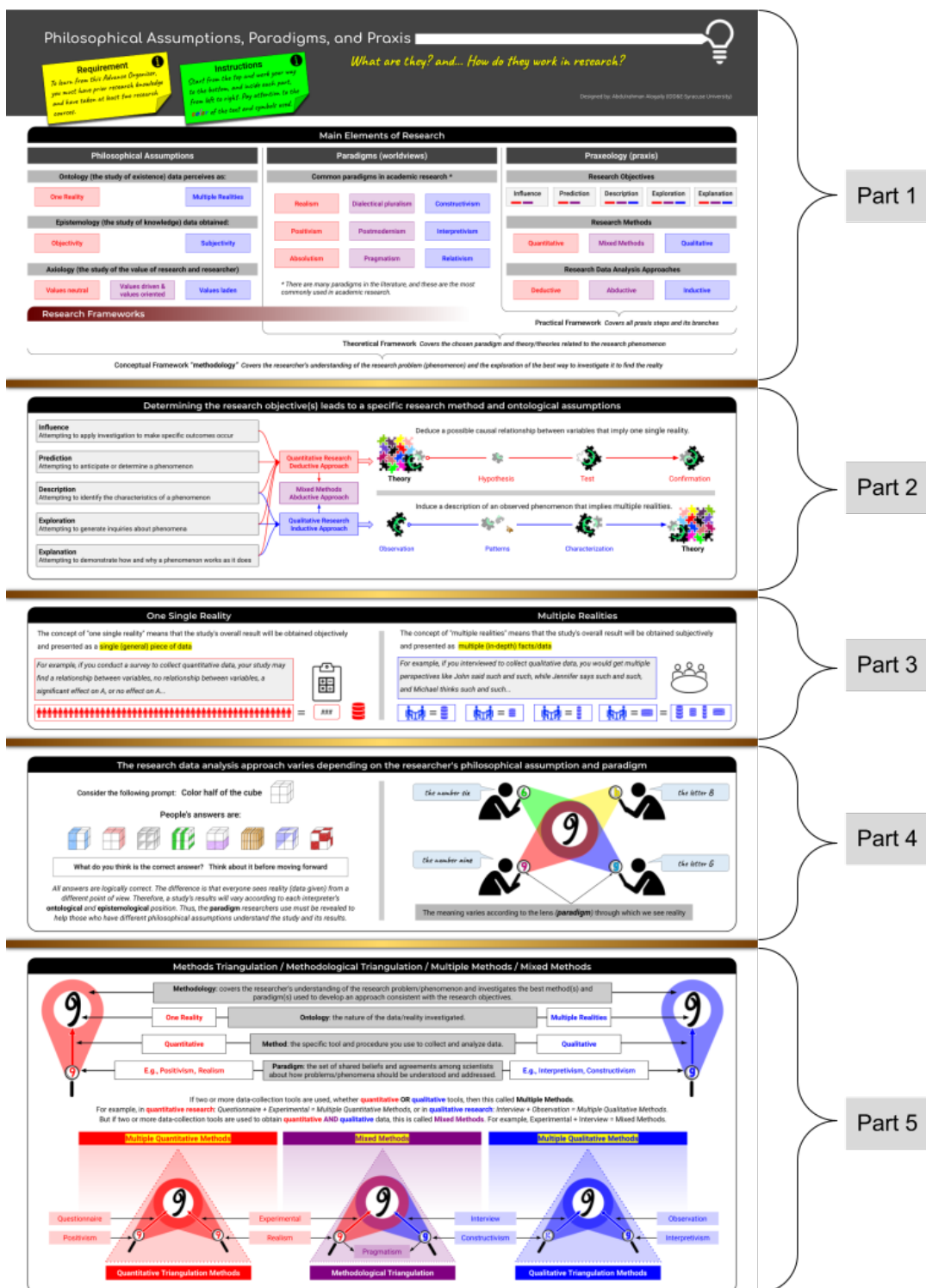


Figure 34. The 3Ps AO presented to experts in the second round of Delphi

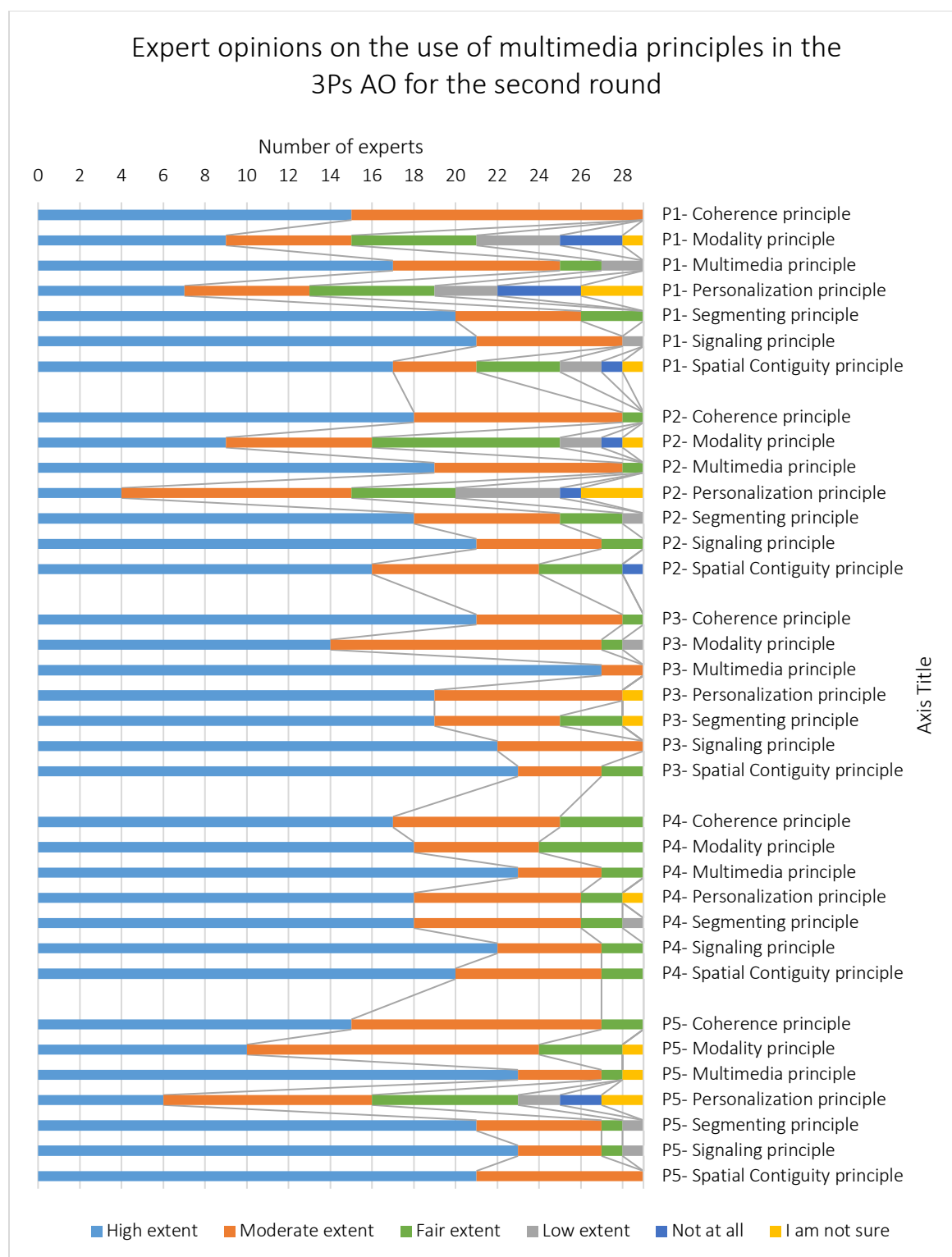


Figure 35. Expert opinion on the extent to which the multimedia learning principles are used in the 3Ps AO in the second round of Delphi

*Table 13. Statistical results of expert opinion on the use of multimedia learning principles of the 3Ps AO in the second round of Delphi*

<b>Multimedia Learning Principles</b>							
	Coherence	Signaling	Spatial Contiguity	Modality	Segmenting	Multimedia	Personalization
# of experts	29	29	29	29	29	29	29
<b>Part 1</b>							
Consensus at 75%	Moderate extent	Moderate extent	Fair extent	Low extent	Moderate extent	Moderate extent	Low extent
IQR*	1	1	2	3	1	1	3
<b>Part 2</b>							
Consensus at 75%	Moderate extent	Moderate extent	Moderate extent	Fair extent	Moderate extent	Moderate extent	Low extent
IQR	1	1	1	2	1	1	2
<b>Part 3</b>							
Consensus at 75%	Moderate extent	High extent	High extent	Moderate extent	Moderate extent	High extent	Moderate extent
IQR*	1	1	0	1	1	0	1
<b>Part 4</b>							
Consensus at 75%	Moderate extent	High extent	Moderate extent	Moderate extent	Moderate extent	High extent	Moderate extent
IQR*	1	1	1	1	1	0	1
<b>Part 5</b>							
Consensus at 75%	Moderate extent	High extent	Moderate extent	Moderate extent	Moderate extent	High extent	Fair extent
IQR*	1	0	1	1	1	0	1

*\*IQR: 2 or less = strong group consensus, 3 and more indicates dispersed responses.*

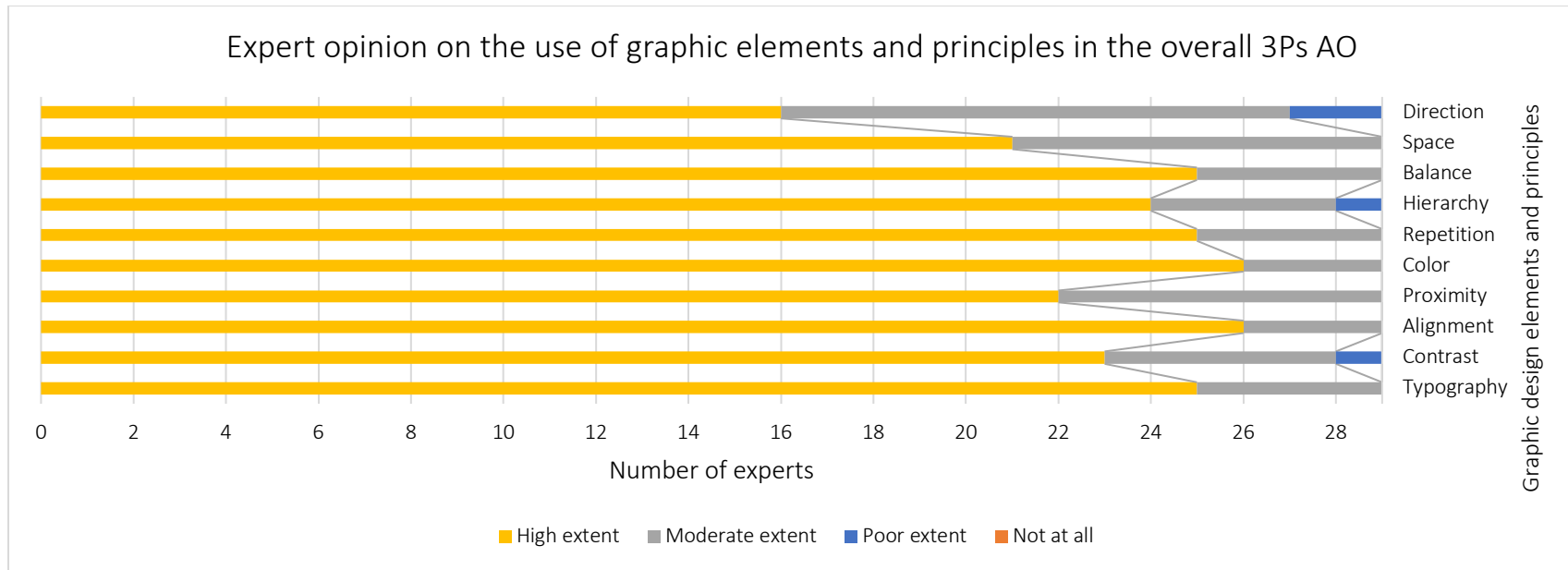


Figure 36. Expert opinion on the use of graphic elements and principles in the overall 3Ps AO in the second round of Delphi

Table 14. Statistical results of expert opinion on the use of graphic elements and principles in the overall 3Ps AO in the second round of Delphi

	Contrast	Repetition	Alignment	Proximity	Color	Typography	Hierarchy	Balance	Space	Direction
# of experts	29	29	29	29	29	29	29	29	29	29
Consensus at 75%	High extent	High extent	High extent	High extent	High extent	High extent	High extent	High extent	Moderate extent	Moderate extent
IQR*	0	0	0	1	0	1	0	0	1	1

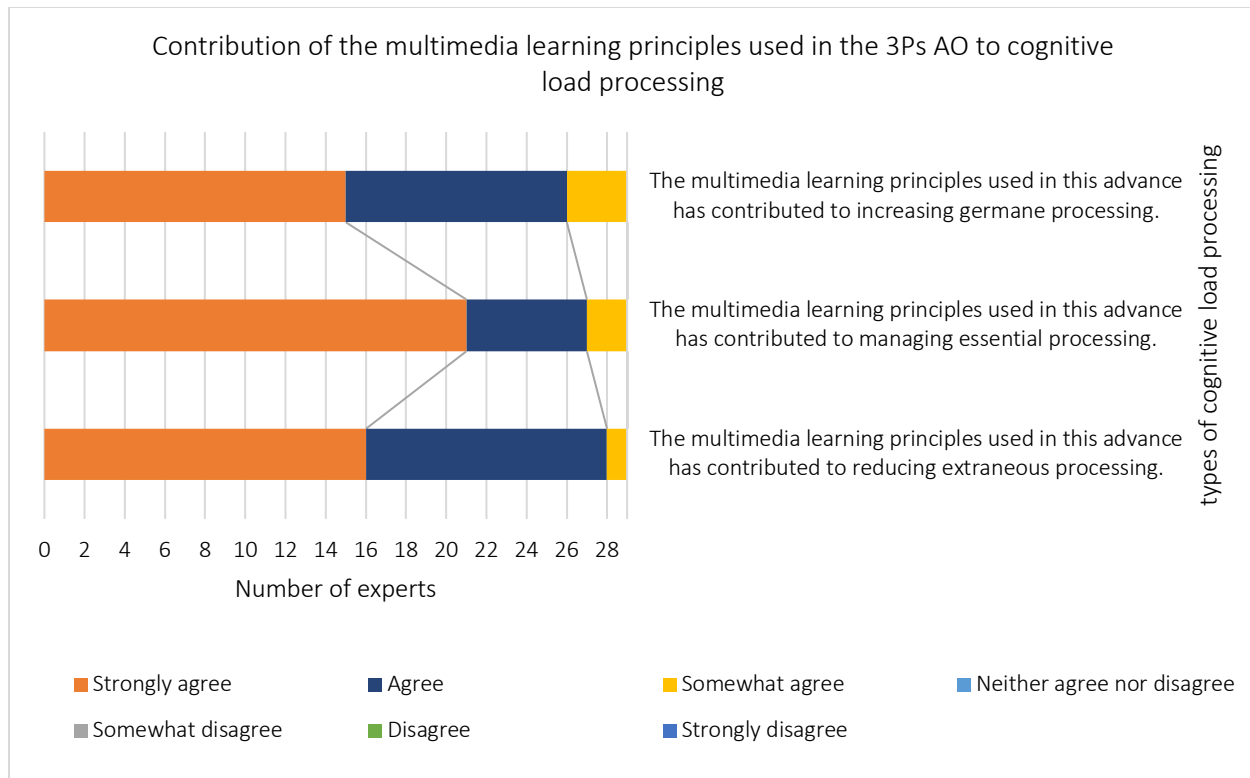
\*IQR: 2 or less = strong group consensus, 3 and more indicates dispersed responses.

The 29 experts responding to this section of the questionnaire provided their opinions on the use of graphic design principles, as shown in Figure 36. They reported a high degree of consensus with  $IQR = 0$  for six categories of graphics design principles and  $IQR = 1$  for four categories, see Table 14. Most observable in term of improvement was the principle of Direction. The most common comment provided in the first Delphi round by many experts related to the direction and flow of the AO. For example, one of the experts said, “What if I am a person who, in their native language, reads right to left instead of left to right? How will I read the AO?” Another expert asked, “What if I have no idea about the content of this AO? Am I going to benefit from this AO, or do I need to learn something in advance?” As described at the end of round 1 results, additional Requirements and Instructions were added to the top of the AO in a Post-It Notes-like graphic to describe how to read the AO. The requirements also suggested a need for prior research knowledge and research courses before using the AO. These instructions guide readers on how to work their way through the organizer, both directionally and by means of colors and symbols.

*Table 15. Statistical results of expert opinion on the contribution of the multimedia principles used in the first version of the 3Ps AO to addressing the cognitive load*

	The multimedia learning principles used in the 3Ps have contributed to reducing extraneous processing.	The multimedia learning principles used in the 3Ps have contributed to managing essential processing.	The multimedia learning principles used in the 3Ps have contributed to increasing germane processing.
# of experts	29	29	29
Consensus at 75%	Agree	Agree	Agree
IQR*	1	1	1

*\*IQR: 2 or less = strong group consensus, 3 and more indicates dispersed responses.*



*Figure 37. Expert opinion on the contribution of the multimedia principles used in the second version of the 3Ps AO to addressing the cognitive load.*

Table 15 shows the experts' opinion on the contribution of the multimedia learning principles to cognitive load processing in the second Delphi round. An IQR of two or less specified a strong group consensus. Just as in the first round, a strong consensus was achieved (IQR = 1) amongst experts on all three measurements: reduction of extraneous processing, managing of essential processing, and increasing of germane processing. Figure 25 shows that the frequency of strongly agree increased in all the categories, especially for managing essential processing. Additionally, the frequency of "somewhat disagree" and "neither agree or disagree" for extraneous processing became 0.



## Adjustments made to the AO after the second round

Based on the data collected in the second round, whether quantitative or qualitative data, many adjustments were made to the AO, as follows:

### Part 1 of the AO (before and after the second round):

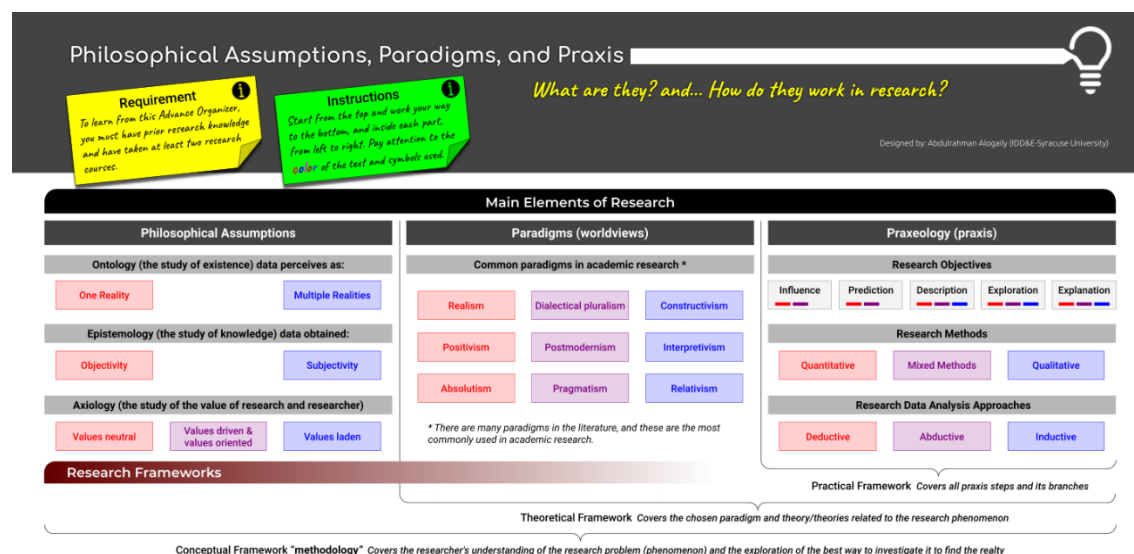


Figure 38. Part 1 of the second version of the AO.

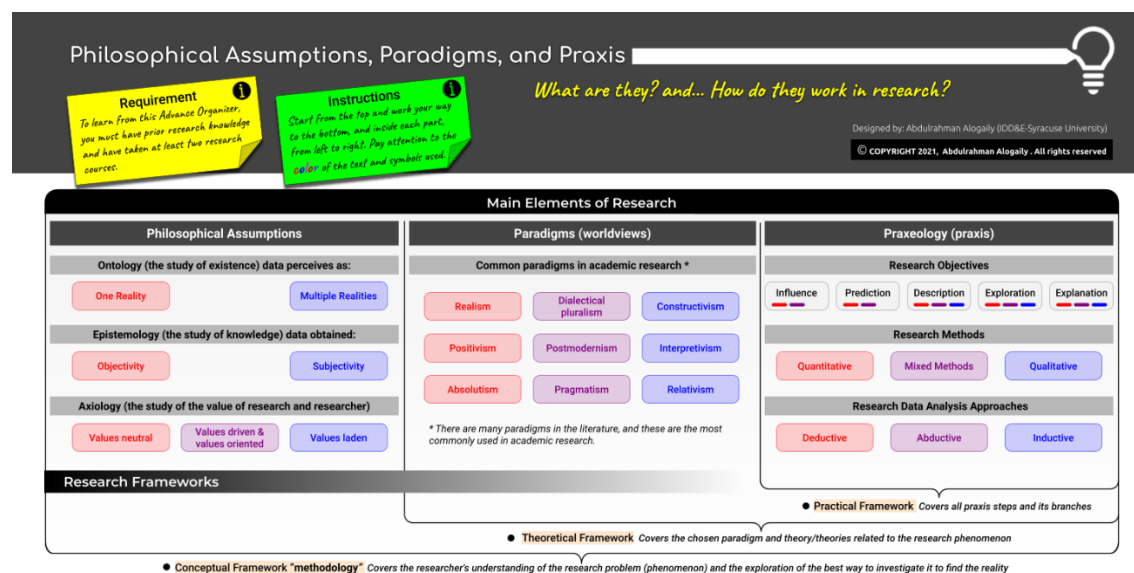


Figure 39. Part 1 of AO after addressing the comments of ID experts in the second round

## Adjustments made for part 1:

- Changed the rectangle's frame to be round instead of sharp.
- Added a frame to the entire part.
- Changed the background color of the frameworks to grayscale.
- Added the phrase "copyright" at the top of the AO.
- Frameworks title types are highlighted and punctuated.
- The lines between the parts of the AO have been removed. (*It does not appear in the Figure 38, but you can see it in the whole AO in Figure 34*).
- Standardized the size and type of headline texts.
- A gray gradient background has been added to distinguish it from the AO background.

## Part 2 of the AO (before and after the second round):

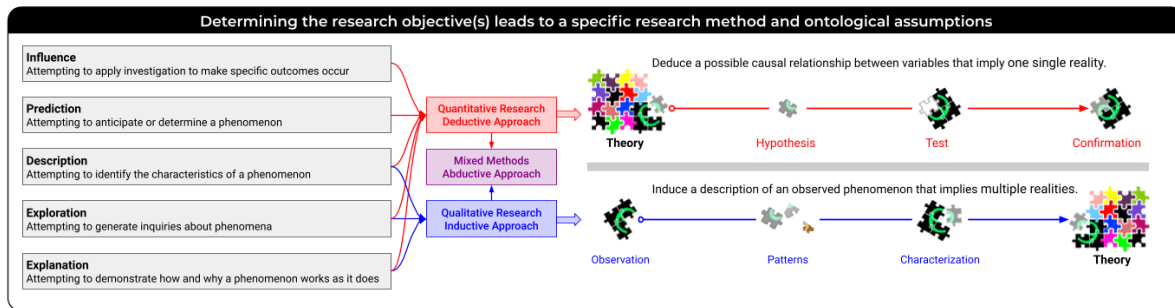


Figure 40. Part 2 of the second version of the AO.

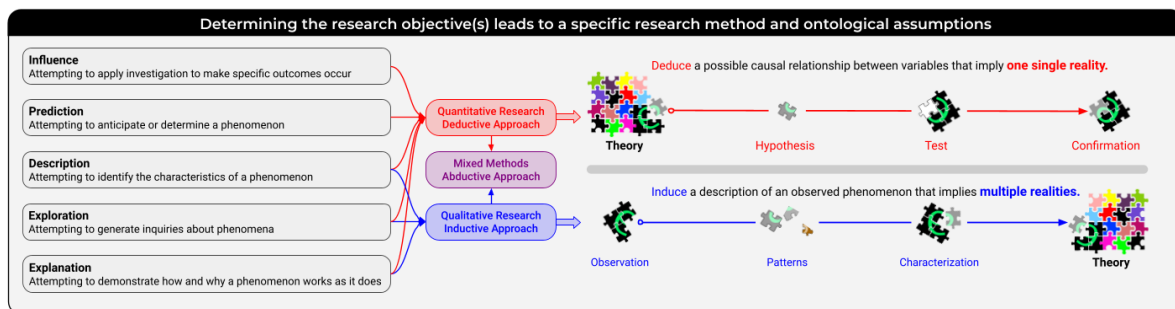


Figure 41. Part 2 of AO after addressing the comments of ID experts in the second round.

### Adjustments made for part 2:

- Changed the rectangle's frame to be round instead of sharp.
- Highlighted the important concepts.
- A gray background has been added to distinguish this part from the AO background.

### Part 3 of the AO (before and after the second round):

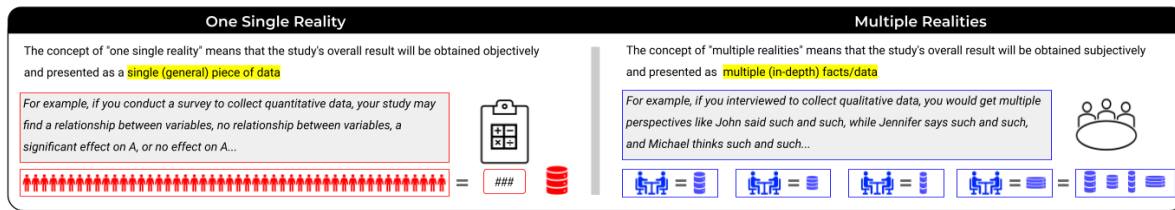


Figure 42. Part 3 of the second version of the AO.

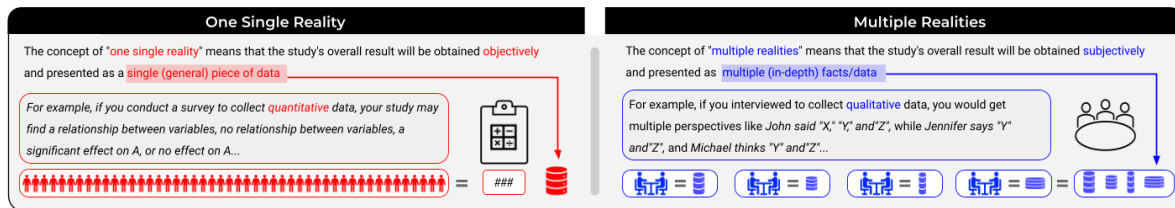


Figure 43. Part 3 of AO after addressing the comments of ID experts in the second round.

### Adjustments made for part 3:

- Changed the rectangle's frame to be round instead of sharp.
- Highlighted the important concepts.
- A gray background has been added to distinguish this part from the AO background.
- The title background has been divided into two parts to reflect the content of each section.
- An arrow has been added, leading to further illustration of important concepts.

### Part 4 of the AO (before and after the second round):

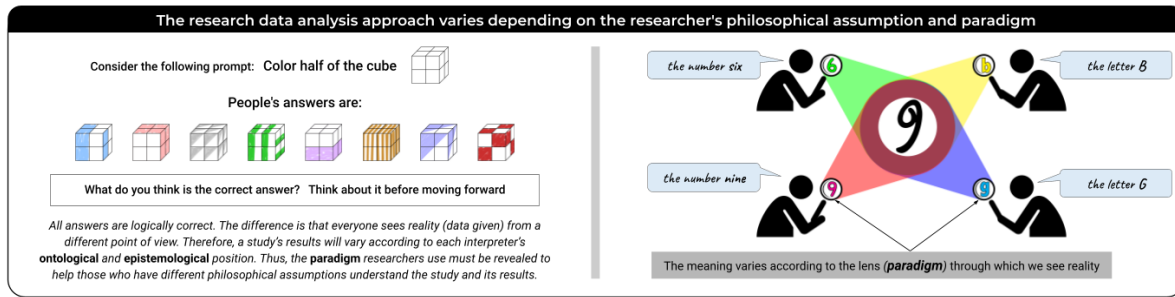


Figure 44. Part 4 of the second version of the AO.

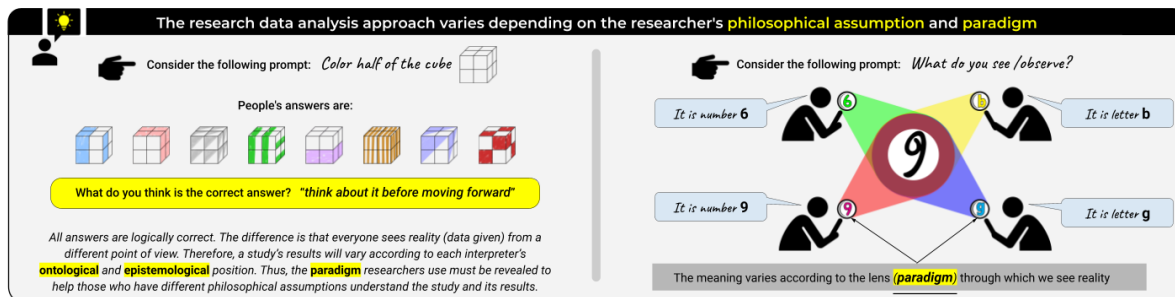


Figure 45. Part 4 of AO after addressing the comments of ID experts in the second round.

### Adjustments made for part 4:

- Changed the rectangle's frame to be round instead of sharp.
- Highlighted the important concepts and elements.
- A gray background has been added to distinguish this part from the AO background.
- The thinking symbol has been added to make the learner feel the importance of thinking in this part instead of just receiving information, as this part presents questions.
- Hand direction icon added to indicate where to start.
- The type of text for questions directed to the learner has been changed.
- The words “six” and “nine” have been replaced by numbers in the second part, and the letters “b” and “g” have been made lowercase to more precisely reflect the idea of the illustration.

### Part 5 of the AO (before and after the second round):

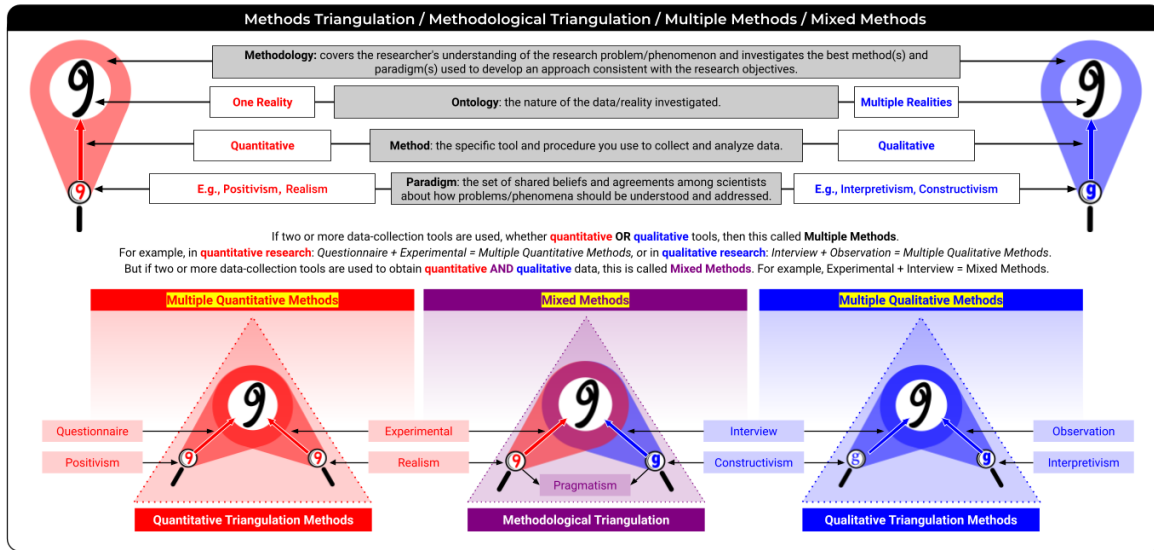


Figure 46. Part 5 of the second version of the AO.

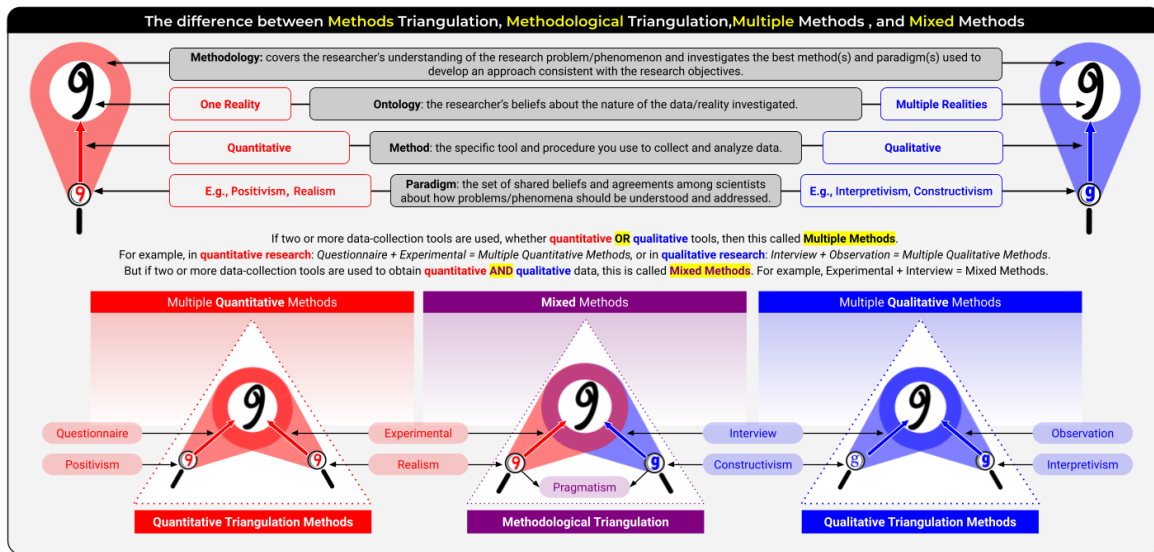


Figure 47. Part 5 of AO after addressing the comments of ID experts in the second round.

#### Adjustments made for part 5:

- Changed the rectangle's frame to be round instead of sharp.
- Highlighted the important concepts and elements.
- A gray background has been added to distinguish this part from the AO background.
- Elements are vertically aligned and the horizontal spacing between them is standardized.

- The background of the triangles has been made in white for added attention.

### **Summary of round two**

The number of modifications made to the AO after the second round is less than that made after the first round. The consensus of instructional design experts in this round on employing multimedia learning principles is higher than in the previous round. In general, the consensus of experts in this round on applying the multimedia learning principles in all parts of the AO was achieved, except for the principle of modality and personalization in the first part only, as the experts ranked them as low applied. It should be noted that the researcher focused on examining the validity of employing these principles on the entire AO, and the wisdom of dividing the parts of the AO due to the different topics presented as well as achieving the features of the AO that are concerned with dividing the complex content into parts in order for the learners to facilitate its containment. This means that if there is a limit in the employment of one of the principles in one part of the AO, the researcher will look at the percentage of its application in other parts. The results showed that the application of the principle of modality and personalization in other parts is high. Besides, the justifications of the experts who ranked these principles as low extent in the first part were the same reasons provided in the first round, which are naturally inconsistent with the nature of this AO, meaning that the narrative required to be achieved in the AO is the written narrative and not the spoken one. The next section presents the results of instructional design experts in the third and final round, which deals with taking their opinion on the 3Ps AO in general as a helpful learning tool.

**Results of the third round of Delphi that contributed to answering the second research question:**

- *To what extent do instructional design experts agree that the overall 3Ps advance organizer is a helpful learning tool?*

The Delphi technique is about obtaining consensus from experts. It's important to note that, as indicated in the Methods section, two Delphi rounds were planned. A third round was prepared to take place if the need arose. After reviewing the results of the second round, the need for a third round was evident. In the first round, sufficient consensus was not achieved, thus indicating a need to modify the 3Ps AO. Therefore, after making modifications, asking for expert overall opinions of the 3Ps AO as a learning tool in the second round was not appropriate because consensus and stabilization checks for consensus had not yet to be achieved. Once consensus was achieved in the second round, it was necessary to gauge overall opinions in a final, or third, round to validate the learning tool. Thus, the first and second rounds showed consensus had been reached on the application of the multimedia learning principles through closed and open questions as shown in Appendix . The focus of the third round therefore was to obtain opinions on the overall AO as a helpful learning tool for novice researchers.

It is important to note there were some missing data from a few of the experts who withdrew during the rounds. These results were not included in the analysis rather statistical analysis was used to handle missing data. As it was previously noted that the number in the first round was 43 experts, while 29 experts participated in the second round. In this third round, 18 experts participated. This number of participants in a Delphi study is acceptable and higher than the number of participants planned in the study Methods section.



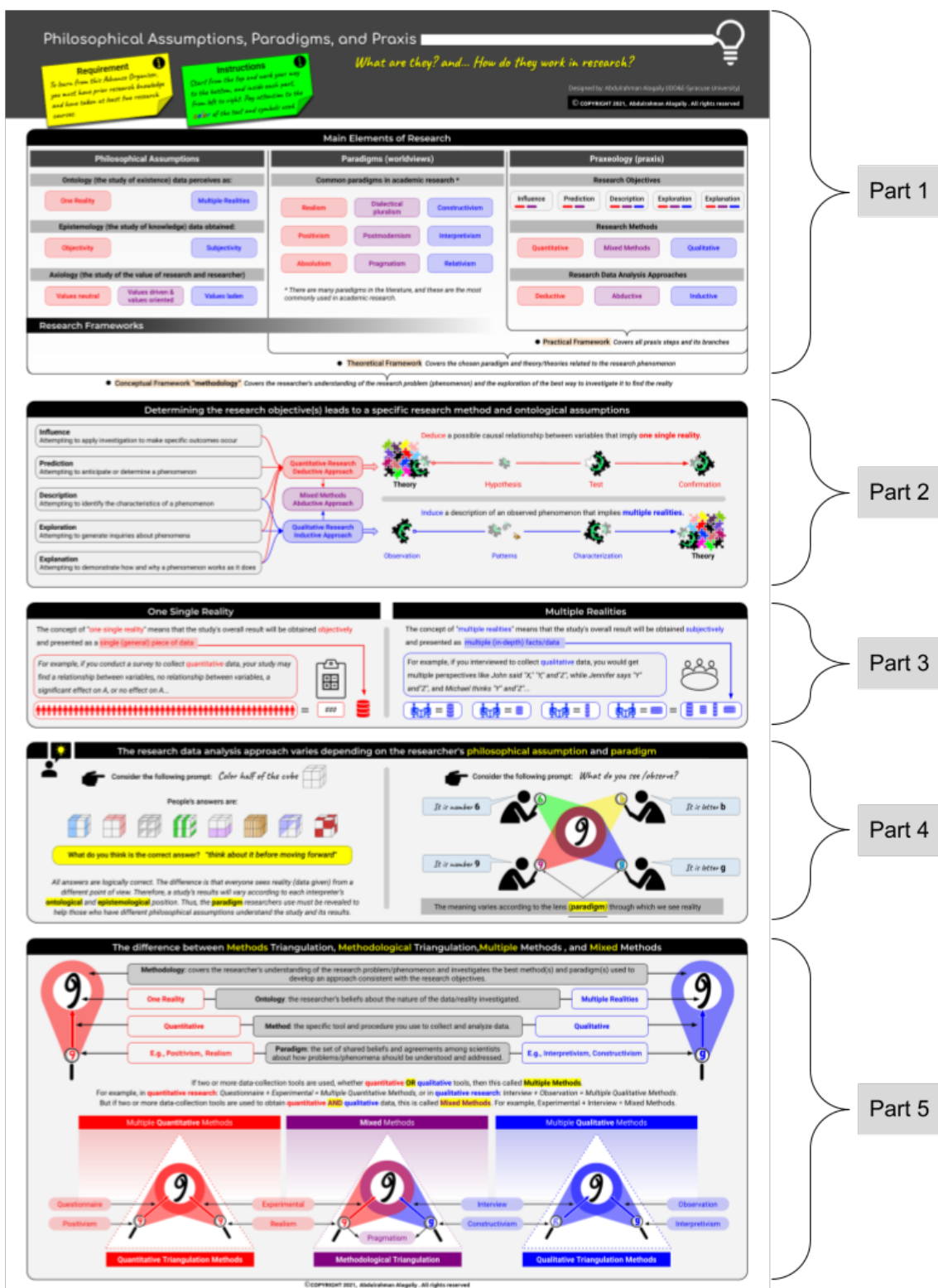
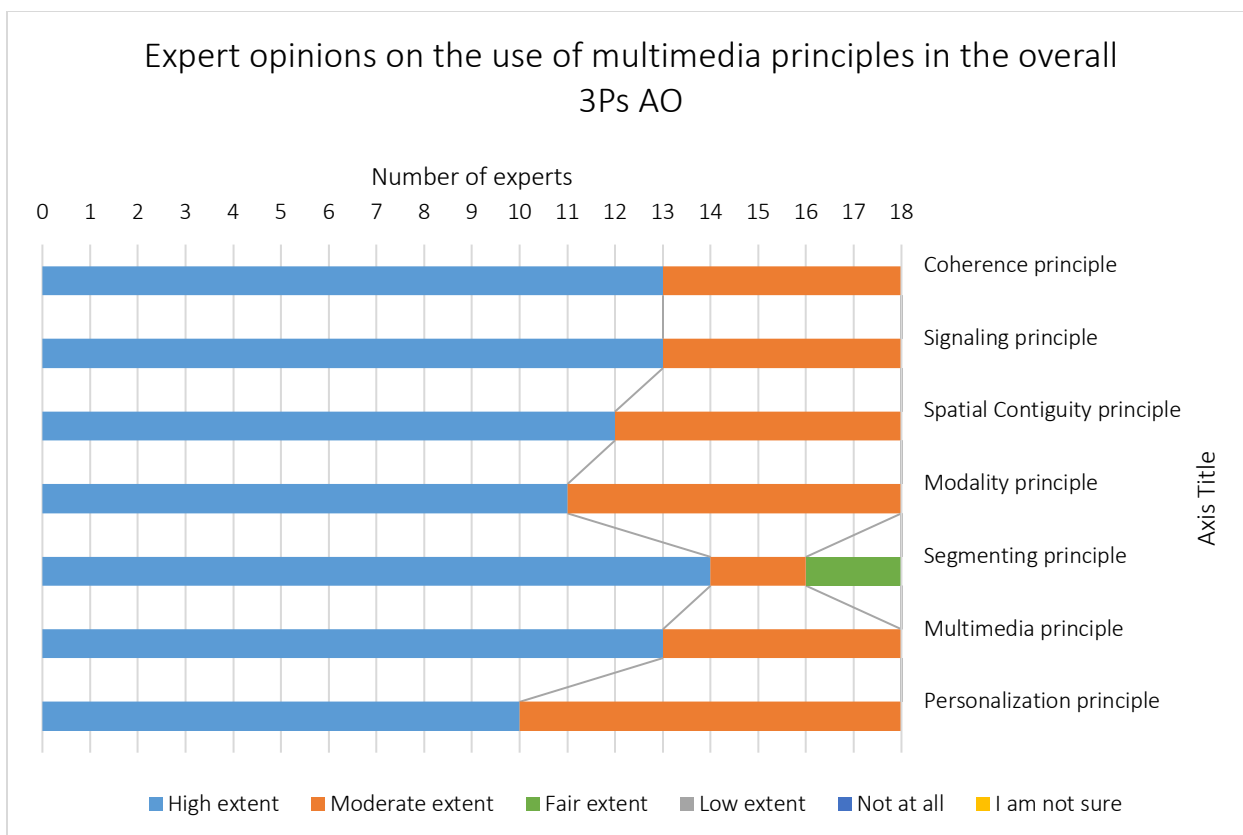


Figure 48. The 3Ps AO presented to experts in the third round of Delphi



*Figure 49. Expert opinion on the extent to which the multimedia learning principles are used in the 3Ps AO in the third round of Delphi*

In the third and final round, 18 experts participated. Experts expressed various opinions about the 3Ps AO in this round. Some completed the closed questions without providing justification in the open questions. Some experts showed their enthusiasm by requesting additional information via the provided e-mail and rapid response process by fully completing the round questionnaire. Even five experts separately requested online meetings after they completed the last round. Those meetings were about discussing the future of the 3Ps AO, and the experts provided some proposals such as developing the AO into a dynamic tool. The researcher welcomed all these proposals and recommendations with open arms and thanked them for that and made clear that there are plans in this regard.

In prior rounds, experts were prompted to respond to the seven multimedia learning principles as they were taken through each section of the 3Ps AO, one at a time. In the third round, experts were asked to gauge their opinion of the overall 3Ps AO as a whole. A strong level of consensus on the implementation of the multimedia learning principles in the AO as a whole was achieved in this round (Table 16,  $IQR \leq 1$ ). Figure 28 shows that none of the experts determined that any of the multimedia principles were implemented to a Low Extent or worse. Only two of the experts rated a principle (segmenting principle) implemented to a Fair Extent, while fourteen disagreed and reported a high level of implementation of the segmenting principle, the highest frequency of High Extent out of all categories.

*Table 16. Statistical results of expert opinion on the use of multimedia learning principles of the 3Ps AO in the third round of Delphi*

	Multimedia Learning Principles						
	Coherence	Signaling	Spatial Contiguity	Modality	Segmenting	Multimedia	Personalization
# of experts	18	18	18	18	18	18	18
Part 1							
Consensus at 75%	Moderate extent	Moderate extent	Moderate extent	Moderate extent	High extent	Moderate extent	Moderate extent
IQR*	1	1	1	1	0	1	1

*\*IQR: 2 or less = strong group consensus, 3 and more indicates dispersed responses.*

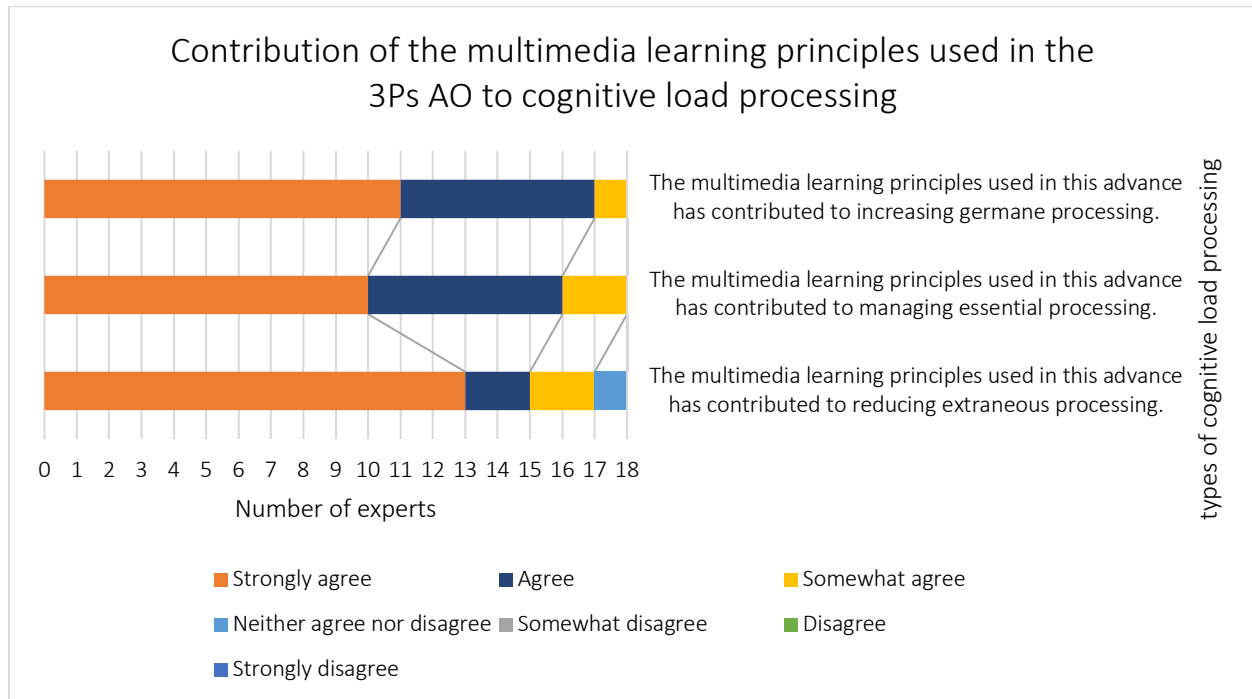
Looking at the overall experts' opinion on cognitive load processing (Figure 49), 18 experts reported a high level of consensus ( $IQR = 1$ ), the same as Delphi round 2. In round 3, 13 out of 18 experts reported that they Strongly Agree that the AO reduces extraneous processing (Table 16). Regarding germane processing, 11 out of 18 reported that they Strongly Agree that the AO increases germane processing. No one disagreed or provided a lesser score among the three

multimedia learning principles in the contribution to cognitive load processing. Only one expert reported indicated a rating of Neither Agree or Disagree, once, and that was in response to reduction of extraneous processing.

*Table 17. Statistical results of expert opinion on the contribution of the multimedia principles used in the third version of the 3Ps AO to addressing the cognitive load*

	The multimedia learning principles used in the 3Ps have contributed to reducing extraneous processing.	The multimedia learning principles used in the 3Ps have contributed to managing essential processing.	The multimedia learning principles used in the 3Ps have contributed to increasing germane processing.
# of experts	18	18	18
Consensus at 75%	Agree	Agree	Agree
IQR*	1	1	1

*\*IQR: 2 or less = strong group consensus, 3 and more indicates dispersed responses.*



*Figure 50. Expert opinion on the contribution of the multimedia principles used in the third version of the 3Ps AO to addressing the cognitive load*

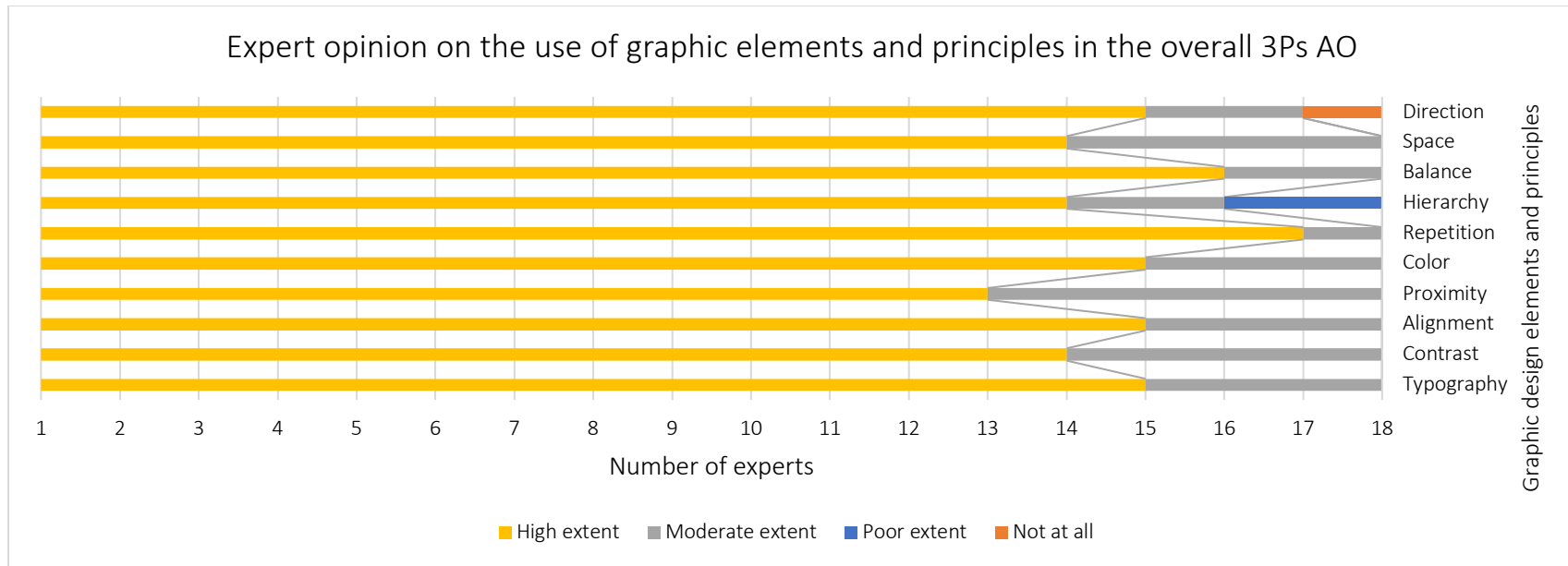


Figure 51. Expert opinion on the use of graphic elements and principles in the overall 3Ps AO in the third round of Delphi

Table 18. Statistical results of expert opinion on the use of graphic elements and principles in the overall 3Ps AO in the third round of Delphi

	Contrast	Repetition	Alignment	Proximity	Color	Typography	Hierarchy	Balance	Space	Direction
# of experts	18	18	18	18	18	18	18	18	18	18
Consensus at 75%	High extent	High extent	High extent	High extent	High extent	High extent	High extent	High extent	High extent	High extent
IQR*	0	0	0	1	0	1	0	0	0	0

\*IQR: 2 or less = strong group consensus, 3 and more indicates dispersed responses.

The experts had a high degree of consensus when judging the use of graphic elements and principles in the AO as a whole, see Figure 51 and Table 18. In the third round, they reported eight out of ten graphic principles as a strong consensus of  $IQR = 0$ . The other two principles had a strong consensus of  $IQR = 1$ . This is in contrast to four  $IQR = 1$  and six  $IQR = 0$  in the second round. The differences between the second and third rounds was in the graphics principles of space and direction, which went from  $IQR = 1$  to  $IQR = 0$ . The expert feedback provided suggestions in round 2 that led to modifications that included removing colors and other objects from the 3Ps AO to the germane cognitive load. Other design elements, like smoothing and rounding of box borders, removing parts breaks, balancing objects across axes, highlighting topics, explanations, and words were also slightly modified, based on feedback, to decrease distractions and draw attention as intended in the AO.

In the final round of the Delphi questionnaire, the researcher posed six open-ended questions to the experts, which they answered appropriately. Data from the first five questions were extracted and summarized in Table 19. The most prominent themes from each question are presented. Actual quotes from the experts' responses about their overall opinion of the AO, are provided from the analysis of the sixth, last, open ended question in the last column of the table.

Table 19. Experts' most prominent answers to the open-ended questions.

Themes	Descriptive	Examples and quotes
<b>How would you describe learning the main elements of research from this advance organizer?</b>		
For Advanced Researchers	Although this tool is designed for novice researchers, some experts have stated that this tool is suitable for advance researchers as well.	<i>"This is an excellent organizer. It is a good primer, especially for developing and novice researchers. I can see a great use for it in introductory and even advance research courses."</i> Participant #12
Manage Essential Processing	There is a strong correlation between the principles of multimedia and information processing in the learner's mind, which was taken into consideration in establishing this advance organizer by employing the theory of cognitive load. One of the features that the 3Ps AO sought to achieve is that the information in the mind of the learner is effectively processed, and what appeared in the comments of the experts is that this AO meets this aspect well as it provides instructions that are stored in the learner's memory to know the details of the research.	<i>"The advance organizer provides the general framework which is stored in memory to learn the details of research."</i> Participant #30  <i>"I think it provides a helpful, organized introduction or refresher for learners."</i> Participant #8
Simplicity	Most of the experts described their answers to this question that although the 3Ps are complicated to understand from the research references, learning them from this AO has become a simple and straightforward matter. Someone mentioned that he personally spent a long time understanding the 3Ps when he was writing his doctoral thesis at that time, which made him wish that he would take time back and use this AO so that he could understand better with less effort.	<i>"This design organized the ideas in a way that helps to understand the content in a simple way."</i> Participant #36
Evoking Tool	One of the main features salient in describing the experts is that learning the 3Ps of this AO is more like an evoking tool that links previous information in the learner's mind to the	<i>The advance organizer helps better connect already acquired knowledge by evoking the underlying microstructure.</i> Participant #39

Themes	Descriptive	Examples and quotes
	new information presented in the 3Ps AO. What is new to mention is that this feature is one of the essential qualities that must be present in the advance organizers in general.	
<b>What do you think is required to comprehend this advance organizer?</b>		
Prior Knowledge		<i>"Learners must have the prior knowledge to comprehend the organizer to store in memory for subsuming the details of the lesson."</i> Participant #22
	Many experts have endorsed that a learner's prior knowledge is a prerequisite for understanding 3Ps AO, which of course is one of the conditions mentioned in the first part of the AO next to the title, which was added in the second and third versions after taking into account the suggestions of the experts they made at the time.	<i>"As an advance organizer, it could be used prior to learning (as intended) to prime learning. I believe it may be more beneficial as a scaffold during learning or a procedural scaffold when applying learning."</i> Participant #11
		<i>"A working or basic knowledge of research vocabulary and terms."</i> Participant #40
Proficiency in English		<i>"I believe that adhering to the conditions stated at the beginning of the design will contribute to achieving the objectives of this organizer as planned."</i> Participant #22
	One of the primary things that the experts pointed out is that the learner must have a proficiency in the English language in order to acquire the relevant knowledge in the AO, because many terms may be difficult for native speakers, let alone non-native speakers. Some experts mentioned that despite the difficulty of those terms used in the AO, the accompanying explanation gave them a distinct clarity, which might contribute to digesting these terms simply.	<i>"Proficiency in the English language; a basic familiarity with research design and principles would be helpful"</i> Participant #30



Themes	Descriptive	Examples and quotes
Lack of examples in praxis	Some experts made points related to adding examples of practical application (Praxis). Nevertheless, the researcher realizes that it may be unmanageable to add examples in every section related to the Praxis aspect in a one-page design. The researcher has detailed this aspect and highlighted the points of Chapter Six.	<i>"The learner should ideally have seen some examples for many terms or ideas presented in the advance organizer (e.g. How does a hypothesis actually look like? What are concrete examples illustrating the difference between correlations and causal links?)"</i> Participant #29
About an hour of time	Through the experts' answers to this question and other questions, there was a quasi-collective opinion that an hour of time or half an hour would guarantee that novice researchers learn from this AO well, provided that the conditions mentioned at the top of the AP are fulfilled. On the other hand, one of the experts mentioned that the novice researchers may not understand the information contained in the AO the first time, as they may need to expand into several sources in order to understand it well.	<i>"The time the learner is supposed to spend in obtaining the information has not been adequately specified. Nevertheless, I believe that half an hour is sufficient for learning from this advance organizer, provided that the learner meets the conditions mentioned at the top!"</i> Participant #8
<b>What are the most prominent learning characteristics of this advance organizer?</b>		
Motivate-able	One of the characteristics that the experts mentioned about AO is that it is a stimulating/motivational(able) learning tool due to the shapes and graphics used. One expert also mentioned that in every part of AO, some new elements and graphics differ from part to part, although you can say that the correlation between the parts is strong. This makes the learner eager to follow more because there is a new story in every part (as described by one of the experts). Another mentioned that a repeated imprint can be seen in all parts in terms of the use of colors, lines, shapes, etc. The designer's fingerprint appears to be evident in parts of AO> so said one expert, too.	<p><i>"Because of the graphics, colors, and layout of the organizer, learners are motivated to attend to the organizer."</i> Participant #15</p> <p><i>"The layout of the organizer with the graphics and colors motivates learners - Keller ARCS Model."</i> Participant #16</p>

Themes	Descriptive	Examples and quotes
Easily captured/Snap ideas	Some experts have described the 3Ps as mentioned in several sources, but these representations or diagrams fail to present the idea to the reader the first time. Besides, some of these drawings may add more complexity, and the reader may turn away from them not understanding anything. Learning the 3Ps from this AO described by many experts is that it delivers information in a lightning manner, which is one of the features of learning in the new generation> according to one expert.	<i>“Ease of capturing information and moving from one step to another despite the fact that the nature of the content has been explained in a complicated way in other references, but it seems here that the instructional and graphic design elements have been used excellently.”</i> Participant #25
		<i>“The advance organizer uses pictorial information (colors, symbols, shapes, spatial organization patterns, etc.) to make the contents (and especially their relationships) more transparent to learners.”</i> Participant #12
		<i>“Signaling and coherence principles are well followed.”</i> Participant #28
Wall poster	What is noticed in the expert responses here is that many of them describe the advance organizer as a convenient tool on the wall for easy reference. Usually, we see posters in the classroom, schools, homes that were not placed arbitrarily, but rather in order to return to them from time to time, or that what those posters display is an important matter that we coexist within our daily life. Among the experts' responses was a distinctive comment, which is to explain that this tool is distinguished by colorful, except that it is not suitable for people who have color blindness because the color in this tool is one of the components of learning from it. On the other hand, an expert described this tool as colorful, which he would like to place on the wall instead of paintings.	<i>“The learner can place this organizer on the wall to look at it from time to time in order to activate the information well, ... not to mention the ease of carrying it in a bag and refer to it when necessary.”</i> Participant #30
		<i>“I would like to place it on the classroom wall and come back to it every time”</i> Participant #36
		<i>“If it could be printed, I think it would be a great wall mounted learning tool.”</i> Participant #8
		<i>“Is some learners are color-blind, will there be an option for black and white version. This is related to inclusive</i>

Themes	Descriptive	Examples and quotes
		<i>education/universal design.</i> " Participant #28 "I'd put it on the wall..." Participant #15
Graphic design principles	The researcher took into account in the design of the 3Ps AO the employment of graphic elements and principles, which many experts recognized in their comments. There are ten graphic design elements and principles that have been used extensively based on expert responses shown in Figure 3	<i>"To understand the coherence across research paradigms and modalities. The designer makes that very clear in the organizer itself."</i> Participant #40
<b>What is the most prominent part of this advance organizer and why?</b>		
Part 5	Many experts' answers went to the fifth part as the most prominent part of this AO, and the reasons they mentioned varied. Some of them mentioned that this part is the core of this AO, as it relates to both the practical and theoretical aspects, and it sums up a long journey in understanding research methods and methodology. Likewise, one expert mentioned that the fifth part focuses on some terms that are commonly used interchangeably in the literature, and this part explains them very well. On the other hand, someone comments that this part is the largest and believes that the size is linked to importance, because its size is large, so this is very important. This last point attracted the researcher's attention somehow greatly.	<i>"In design, size usually connotes importance. So, the fifth section focused on applying the methods is larger than the other sections and is much more complex in its application. The colors used in this section also stand out more than the other sections."</i> <i>"I would say the box at the bottom, because it takes up many contents from the other boxes and presents them in a more holistic way."</i> Participant #39  <i>"The sticky notes at the top are bright and helpful orienting tools. The graphics at the bottom stand out visually."</i> Participant #16  <i>"The fourth and final part as it contains the most advanced content."</i> Participant #29
<b>In general, what could be done to improve this advance organizer?</b>		
Additional adjustments	Some experts made recommendations to amend some parts of the AO. Some of the proposals included adjustments in the font size and some suggested reducing the colors. In general, there weren't many comments made by the experts in this section.	<i>"if possible, I would try to size them up a bit the puzzle since the grey pieces are a bit too small."</i> Participant #40  <i>"Make the title of the graphic bigger than everything else"</i> Participant #11

Themes	Descriptive	Examples and quotes
Standardization of parts size	As indicated in one of the experts' answers in the previous question about the size of the AO parts, a number of experts returned to present the same point and recommend the standardization of sizes. The researcher explains his thoughts about this point in detail in Chapter Six.	<i>"I would encourage you to take a look at the size of the part and standardize it..."</i> Participant #14
For advanced researcher as well	Some experts focused on in their recommendations, starting from the first round until this round, that this AO should be inclusive of researchers in general and not focus only on novice researchers. Some of the experts mentioned that advanced researchers who spent many years practicing research may lack understanding of the concepts related to the 3Ps, and that the 3Ps AO is doing a tremendous job in clarifying those concepts well.	<i>"The advance organizer is well designed. I assume that the advance organizer is intended for researchers in general and not just learners at the university level only."</i> Participant #22
Beyond the use of learning	A group of experts came up with some suggestions for the AO use; some mentioned that it could be helpful as a guide for research courses at the university level, meaning that courses can focus on the first part and then the other course so on. Some experts also stated that this might be a practical guide if used in the research courses syllabus. On the other hand, some experts mentioned recommendations that go further than that. One of them explained that this AO would be great if it used research handbooks to summarize the main ideas presented in the different chapters.	<i>"Very clear and concise. It would be great if some handbooks on empirical research used this advance organizer to summarize the main ideas presented in the different chapters."</i> Participant #26

According to the last open-ended questions, experts were asked for, *"Comments about the overall advance organizer."*

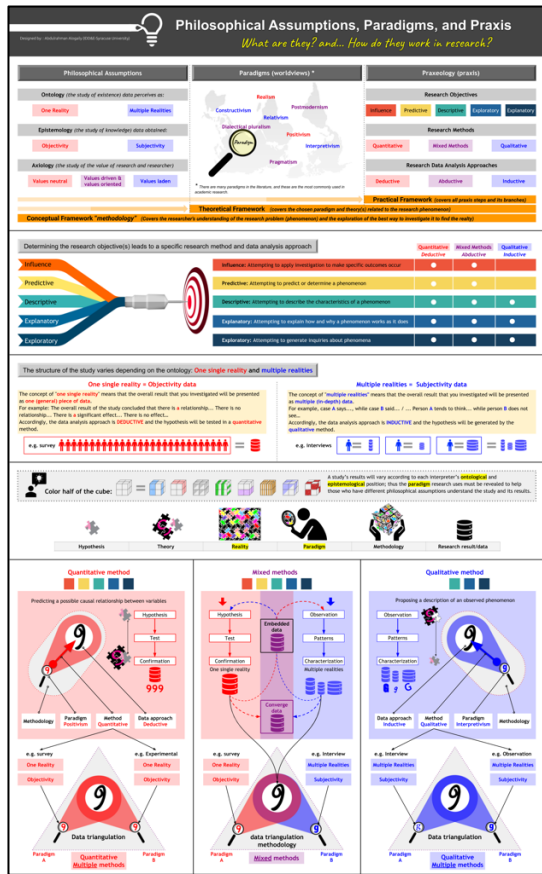
Experts responded to this question differently. Some of them put themselves in the position of students and described it as a study or practical tool. One expert remarked, “This tool highlights the most important points that graduate students struggle to understand, and I hope it will be applied to students to see its impact on their understanding. This study will be useful in the research literature.” Another wrote, “It can be said that it summarizes the researchers for reading dozens of references to understand research content.” Still others commented that they wanted to have this AO to use for classes as a pedagogical tool. One called this an “extraordinary instructional tool.” Another expert said, “In general, this is a useful tool for researchers and instructors,” with another remarking that it was a “dedicated and comprehensive work that will be a useful educational tool for researchers.” Others commented that the AO was a comprehensive tool, taking advanced and complicated ideas and making them simple. Yet another said, “I think this organizer manages to convey complex information in a fairly concise manner.” Relatedly, another wrote, “This design covered the most complicated steps of research. They are presented in a simple and easy-to-understand manner with images and terms that can be effectively remembered.” Another pointed out initial concerns that were overcome with a full review of the AO, “This tool’s structure may seem complicated at first, but the desired objective will be achieved adequately when reviewed as divided parts... in general, this is a comprehensive tool, and the content you talk about is quite complex in the references, but this tool did a great job in simplifying that content. Nice job!” Still another wrote, “I find myself happy to participate in validating this organizer. It is well designed and has presented a basket of complex information in an easy way that will overcome many of the challenges that researchers face, particularly in understanding matters related to philosophical assumptions. However, to achieve its goals as required, the comments mentioned before must be

considered, especially the points related to the principles of cohesion.” In short, these comments appear resoundingly positive.

It should be noted that most of the points mentioned by the experts in their answers to the previous questions about the description of 3Ps AO correspond to the characteristics of the advance organizers mentioned in the literature review chapter, providing further evidence that the 3Ps AO achieved the required characteristics well, such as being abstract, generalizing, comprehensive, simplifying complex concepts, and linking previous knowledge with new knowledge.

The development of this 3Ps AO has gone through more than 14 methodological stages over two years, from gathering the content visible in the 3Ps AO, to investigating its validity as a valid learning tool by experts in instructional design. The experts provided their contributions in a series of rounds to verify the use of multimedia learning principles, elements and principles of graphic design, and their contribution to addressing cognitive load. Figure 52 shows the difference between the initial release and the final version of the 3Ps AO, and a brief description of the vital role the principles played in developing the 3Ps AO. The principle of pre-training was not among the principles that were investigated in the questionnaire that was presented to the experts during Delphi rounds because this principle is usually verified through two types of procedure, either by providing training courses before presenting the learning tool or providing specific criteria or conditions to ensure that the people who will use this tool have prior knowledge. The researcher chose the second procedure to present the conditions and instructions to the users and it was verified during the rounds by the experts and placed at the top of the AO.

## Initial 3Ps AO



## Modifications made<sup>4</sup>

**Coherence principle:** exotic icons, words, frames, objects, and backgrounds were excluded.

**Signaling principle:** highlighting terms and keywords, organizing objects and text inside boxes.

**Spatial contiguity principle:** placing words, icons, and symbols near the relevant texts.

**Segmenting principle:** dividing large/complicated parts into manageable chunks.

**Modality principle:** providing narratives and graphics that explain some concepts instead of using text only. Knowing that the narration used in the AO was limited, it fulfilled the purpose.

**Multimedia principle:** explaining some concepts with graphic/icons and words instead of just words.

**Personalization principle:** using the conversational style instead of the formal style in some parts.

**Pre-training principle<sup>5</sup>:** placing requirements and instructions of use to ensure that users achieve prior knowledge of the 3Ps content.

## Final version of the 3Ps AO

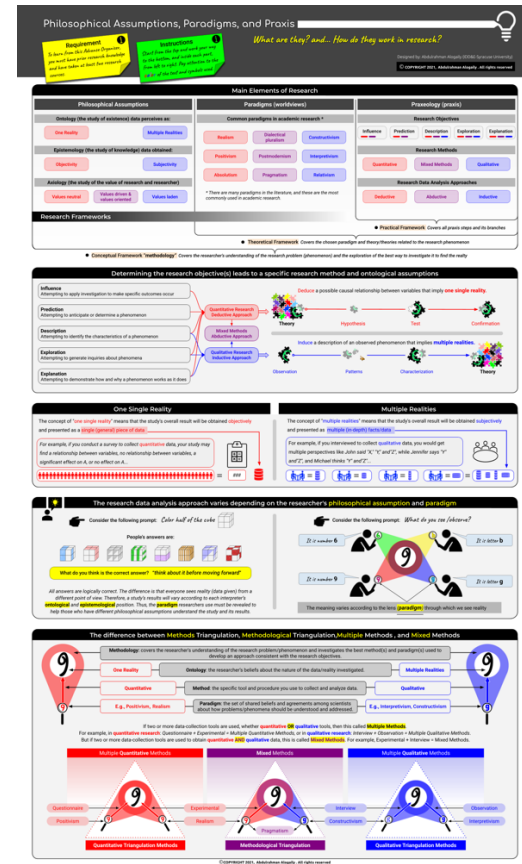


Figure 52. A comparative overview of the first and final versions of 3Ps AO.

<sup>4</sup> The list provides a brief description of the vital role the principles played in the development of the AO.

<sup>5</sup> The pre-training principle has not been investigated in the Delphi rounds, as it is achieved by adhering to the conditions added at the top of the AO as approved by the experts

## **Summary of the outcome of phase I**

The results presented in this chapter share expert responses from three rounds of Delphi to validate the employment of multimedia learning principles in the AO of the 3Ps. Forty-three experts participated in the first round, 29 in the second round, and 18 experts in the third round. During these rounds, experts provided their comments on the AO and provided their opinions on the employment of multimedia learning principles. The results also share expert opinions about the 3Ps AO as a learning tool for novice researchers.

The data obtained in this chapter answered the first and second research questions of the study as planned. The overall result in this chapter showed the consensus of instructional design experts on the effective application of Multimedia Learning Principles (Coherence, Signaling, Spatial Contiguity, Modality, Segmenting, Multimedia, and Personalization) to a high extent in the 3Ps AO. Further, the data showed a consensus among the experts, on several dimensions, that this 3Ps AO, in its final version (round 3) is a helpful learning tool.

There were some challenges in communicating the idea of the study to the experts in the first round, especially concerning displaying the AO on their screens. As some of them mentioned that the AO was so small that it was not possible to read the details. In response, a brief description was provided to the participants on how to open the AO to a full size. This included merely clicking on the graphic to make it appear larger on the screen. Such limitations are acceptable, occur in daily life in a digital world, and appeared to have little if any effect on participation. The next chapter presents the results of the second phase of this study concerned with gathering both novice researchers' perceptions on the 3Ps of research and their thoughts about the 3Ps as presented in the AO that was validated in this chapter.



## **CHAPTER 5. RESULTS OF THE SECOND PHASE (Phenomenological study)**

### **Introduction**

The literature is rich with descriptions about the multiple aspects of research, defining the three critical research components as philosophical assumptions, world views or paradigms, and praxis – 3Ps. There is also evidence that novice researchers are often prepared in praxis; however, their early preparation as scholars falls short in helping them develop an understanding and use philosophical assumptions and paradigms to explain and contextualize their own scholarship. This lack of using the 3Ps sometimes makes it difficult to gain credibility with researchers who have alternate views of the same or similar phenomena. To help remedy this gap in knowledge, a 3Ps advance organizer was constructed. Careful attention was taken to cover the large and complex topic of the 3Ps using multimedia principles assuring clarity and focus on the message. Upon review during the phase one Delphi study, instructional design experts suggested that the multimedia learning principles had been effectively applied to the 3Ps AO thereby validating the overall design of this learning tool. These experts also reached a consensus on identifying the 3Ps AO as a helpful learning tool. Since this 3Ps AO aims to be a suitable learning tool for researchers, especially novices, a second phase in this study was conducted to gather data on the novice researchers' perceptions of the 3Ps – research in general, and then, to gather data on their impression of the use of the 3Ps AO in research thinking and practice. This chapter presents the results of phase 2 – phenomenological study to explore novice researchers' perceptions of the 3Ps and describe their impressions of using the 3Ps AO on their research thinking and practice.

Phase 2 of this dissertation uses a phenomenology approach to collect data to provide a deep description of the understanding that novice researchers have about the 3Ps of research and

the 3Ps AO as a learning tool. Interviews were the primary data collection tool used to gather data on this phenomenon.

This chapter presents the results of the interview in four main sections:

- A description of the novice researchers' demographics and their research backgrounds;
- An exploration of novice researchers' perceptions of the 3Ps, which respond to the third research question;
- A description of novice researchers' impressions of the 3Ps AO, which respond to the fourth research question;
- A final section that provides a summary of the data.

Each section includes a description of the data collected and how these data contributed to each research question. In general, the nature of this study's data is qualitative and based on the inductive approach in the analysis, which was explained extensively in Chapter 3.

Fourteen interviews were conducted online; All interviews were conducted one-on-one with the novice researchers, following the process shown in Figure 53 (This is the same Figure 7 in Chapter 3. This figure is presented here as a reminder to help illustrate the interview process.).

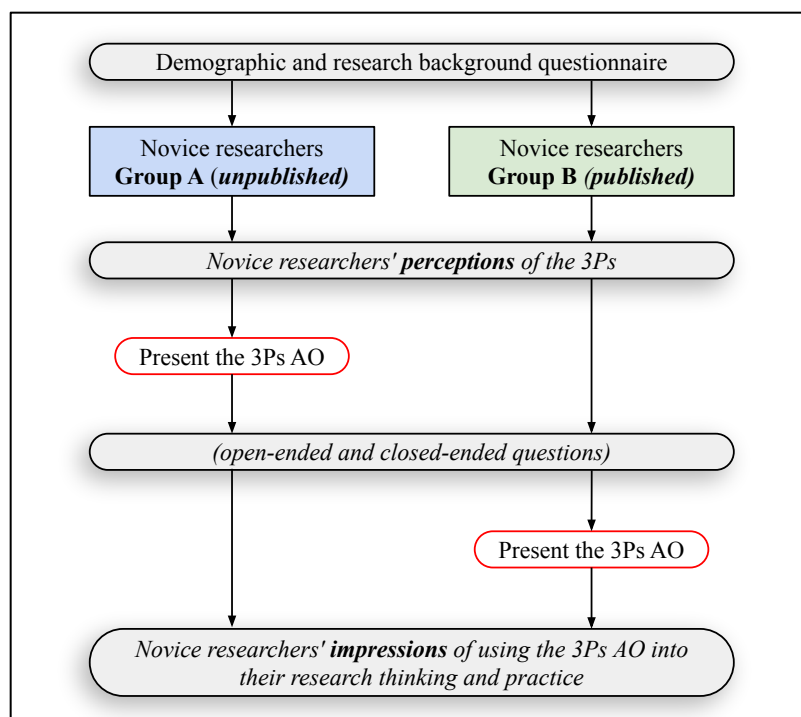


Figure 53. Novice researchers' interviews, main structure

The nature of the research objectives in this study phase were exploratory and descriptive. In terms of exploration, the study aimed to provide insights and understanding of novice researchers' perceptions of the meaning of the three elements of research, while the descriptive objective focused on describing the novice researchers' impressions in general on the use of the 3Ps AO— provided data-rich content. Semi-structured interviews were used to extract data effectively and consistently from the participants to achieve the study's objectives. Each of the interview sections illustrated in Figure 53 contains activities and scaffolding questions based on the third and fourth research questions. Data were analyzed using thematic analysis.

#### **A description of the novice researchers' demographics and their research backgrounds**

All participants completed the demographic and research background information questionnaire, which is considered the first step in the interview, as shown in Figure 54. The questionnaire, as shown in Appendix 12, included nine questions. These questions were compulsory, meaning that no participant would complete the questionnaire without answering

them all; only the answers to the name question were not included in the data to preserve participant confidentiality, and pseudonyms have replaced it.

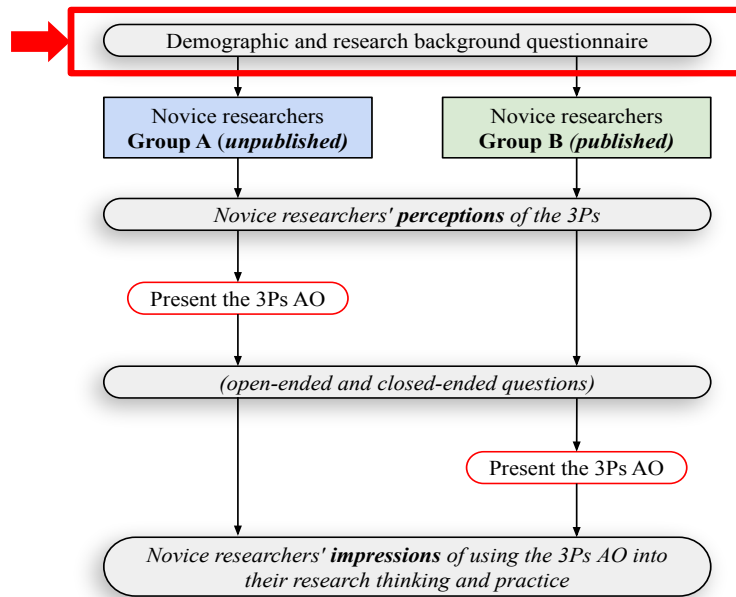
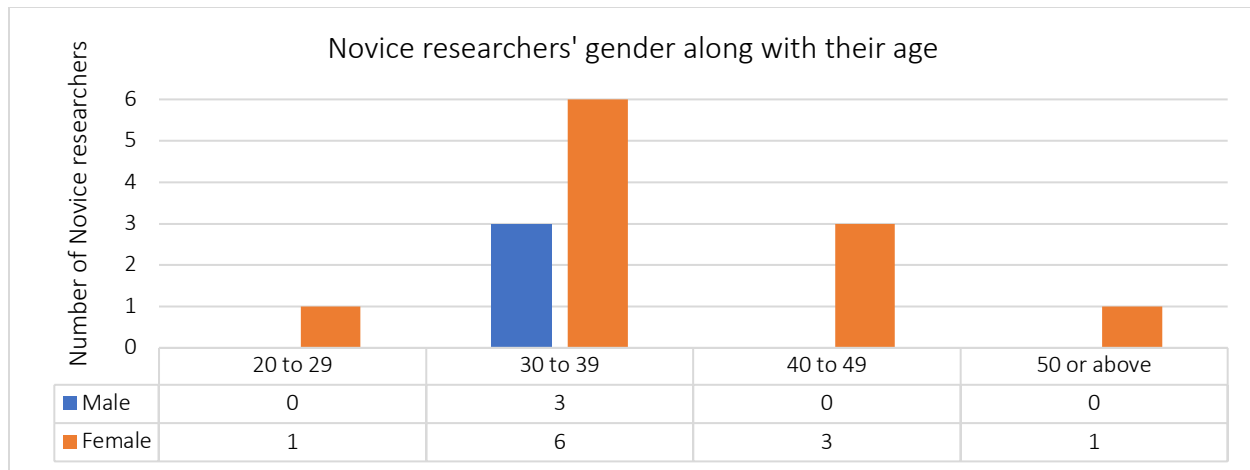


Figure 54. The first step of the novice researchers' interview structure

The main objective of this step was to identify the characteristics of the participants in order to distribute them into two groups. The main goal of dividing the two groups was to provide a detailed description of the experiences of the novice researchers who reviewed the 3Ps AO before or after the interview. Thus, Group A was the less experienced group, and Group B was more experienced as defined by the number of publications. This qualitative differentiation allows the researcher to explore responses of novice researchers who have no research publications and those novice researchers who have experience describing their research. The goals were to slightly manipulate the data collection of the two groups to elicit experiences, beliefs, and opinions based on experiences rather than on biasing responses based on the presentation of the 3Ps AO. This approach also attends to comments from the instructional design experts from the Delphi who indicated that the 3Ps AO is also suitable for more advanced research students, not exclusively for novices, allowing the easier organization of interview comments along with the inexperienced and

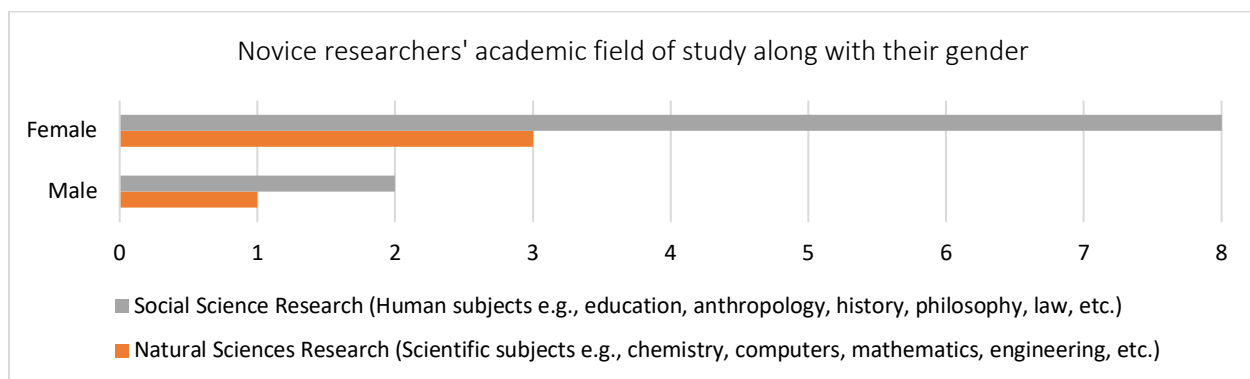
somewhat experienced novice researchers. In other words, this provided an opportunity to explore the expressions of students who have some experience in research versus students who do not have much experience by placing them in two groups bifurcated by publishing experiences.

As shown in Figure 55, there are 11 female and three male participants, all of whom varied in age. All participants were at various levels of study for doctorates in philosophy, from different institutions in different states. However, gender was not one of the points considered when dividing the two groups because most of the novice researchers were female, and there were only three males. Since the number of interviewees was more than 10, these data were analyzed based on a comparison between the two groups to reduce data prevalence and focus on critical points. In general, data collected from large numbers of novice researchers during one-on-one interviews have different dimensions, making it difficult to find themes or traits among the respondents' responses even if the interview is semi-structured (Galletta & Cross, 2013; Kuzel, 1999b). However, a degree of importance was given to the novice researchers' answers that were not homogeneous or compatible with other answers, especially when it came to the interview's central questions, to give each novice researcher a voice.



*Figure 55. Age and gender of the novice researchers who were interviewed*

The questionnaire contained a question about the research field that they are interested in, whether social science research (Human subjects, e.g., education, anthropology, history, philosophy, or law) or natural sciences research (Scientific subjects, e.g., chemistry, computers, mathematics, or engineering), and as shown in Figure 56, the result is that 10 novice researchers are studying social sciences, eight of whom are females, and two are males. Four people are studying in the natural sciences, three female and one male.



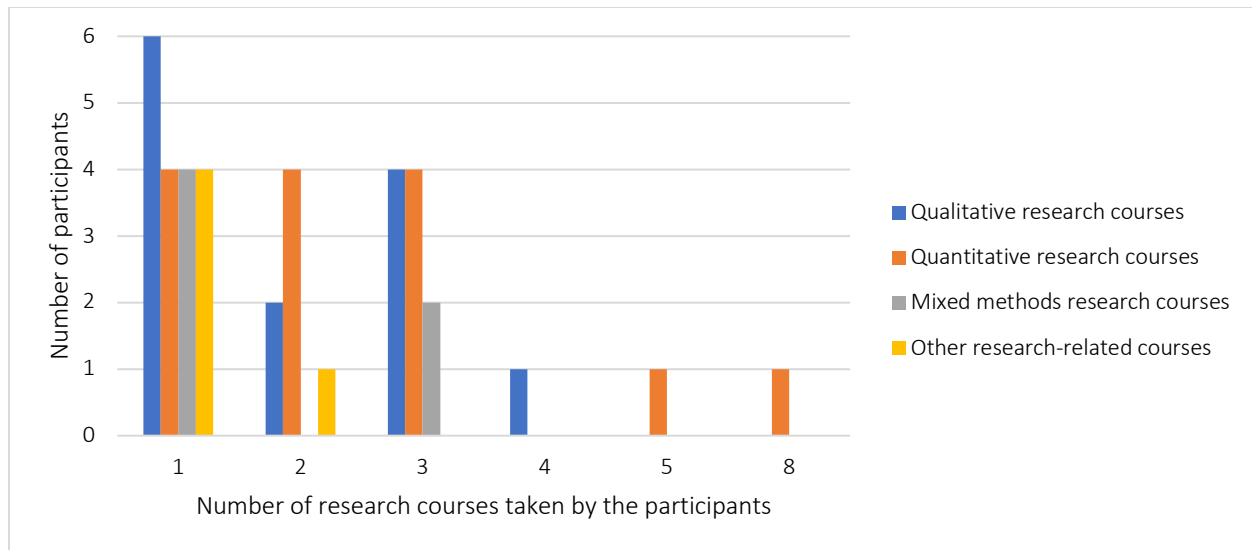
*Figure 56. Novice researchers' academic field of study along with their gender*

The novice researchers' experience in the research varied as shown in Figure. 57, where it was found that there are 5 novice researchers with three years of experience in the research and three novice researchers for one year, while the experience range of the rest of the novice researchers is 12 years.



*Figure. 57 Novice researchers experiences in research*

Figure 58 shows the number of research courses that the novice researchers took during the postgraduate level. Six novice researchers took only one qualitative research methods course. Four novice researchers took one each of quantitative, mixed-methods, and another research-related course. Four novice researchers took two quantitative courses, and two novice researchers took two qualitative research courses. One person took two other research-related courses, Dissertation Seminar and Narrative Inquiry. Four novice researchers took three each of qualitative and quantitative courses. Two novice researchers took three mixed-methods research courses. One person took as high as eight courses in quantitative research methods, and another took five. One person took four courses in qualitative methods.



*Figure 58 Research courses taken by novice researchers at the postgraduate level*

There was a question about the highest academic degree the novice researcher has obtained or is currently studying. There were five options: Doctor of Philosophy, Doctor of Education, Master of Science, Master of Arts, or otherwise, and the results showed that all of the 14 novice researchers were studying for a doctorate of philosophy in different disciplines and from different universities.

Figure 59, shows the number of research publications for the novice researchers, including papers accepted for publication, as it was found that 7 novice researchers did not publish scholarly work. In comparison, four novice researchers published one paper, and three novice researchers published three papers, while the last novice researcher published four papers.



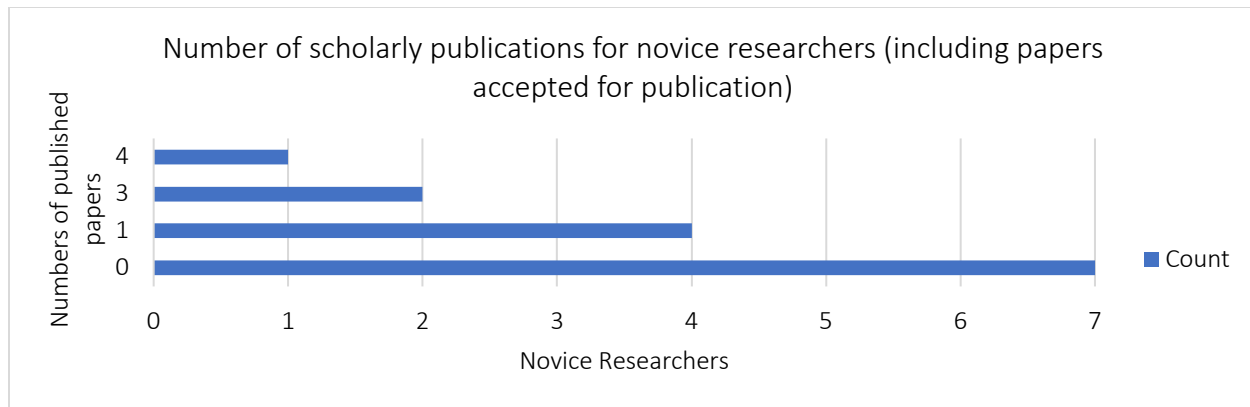


Figure 59. Number of research publications for novice researchers

The participants identified their field of study as either natural science or social science; 5 social sciences and 2 natural sciences majors were in each of the two groups. See Figure 60.

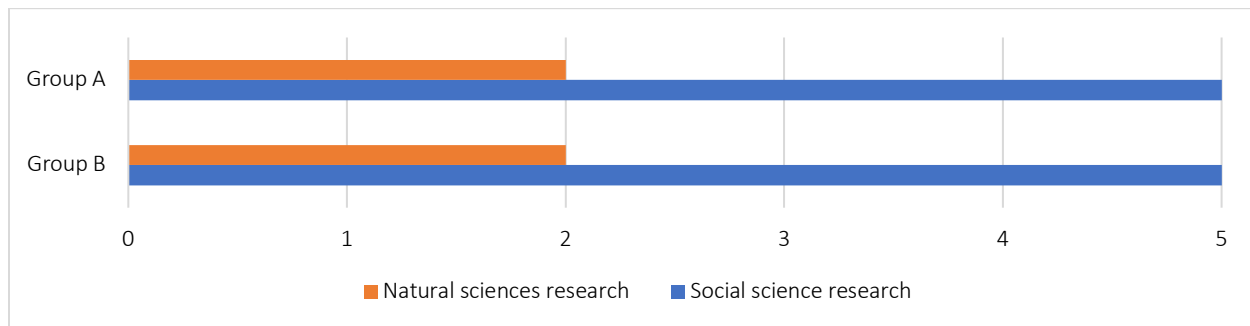


Figure 60. The field of study of novice researchers in each group

Participants provided a self-assessment of their research knowledge. Interesting and unexpected differences were found between group A (the no publications group) and group B (the group of novice researchers with publications.) As seen in Figure 61, Group A self-reported a high level of knowledge in developing research questions and defining research problems. Group B self-reported the highest levels of knowledge in theoretical frameworks and data interpretation. Both groups reported relatively low levels of knowledge in axiology and ontology. In fact, in Group A, only two categories received any ratings of “None”—axiology and ontology. In Group B, four categories received at least one rating of None: practical framework, axiology, ontology, and mixed methods.

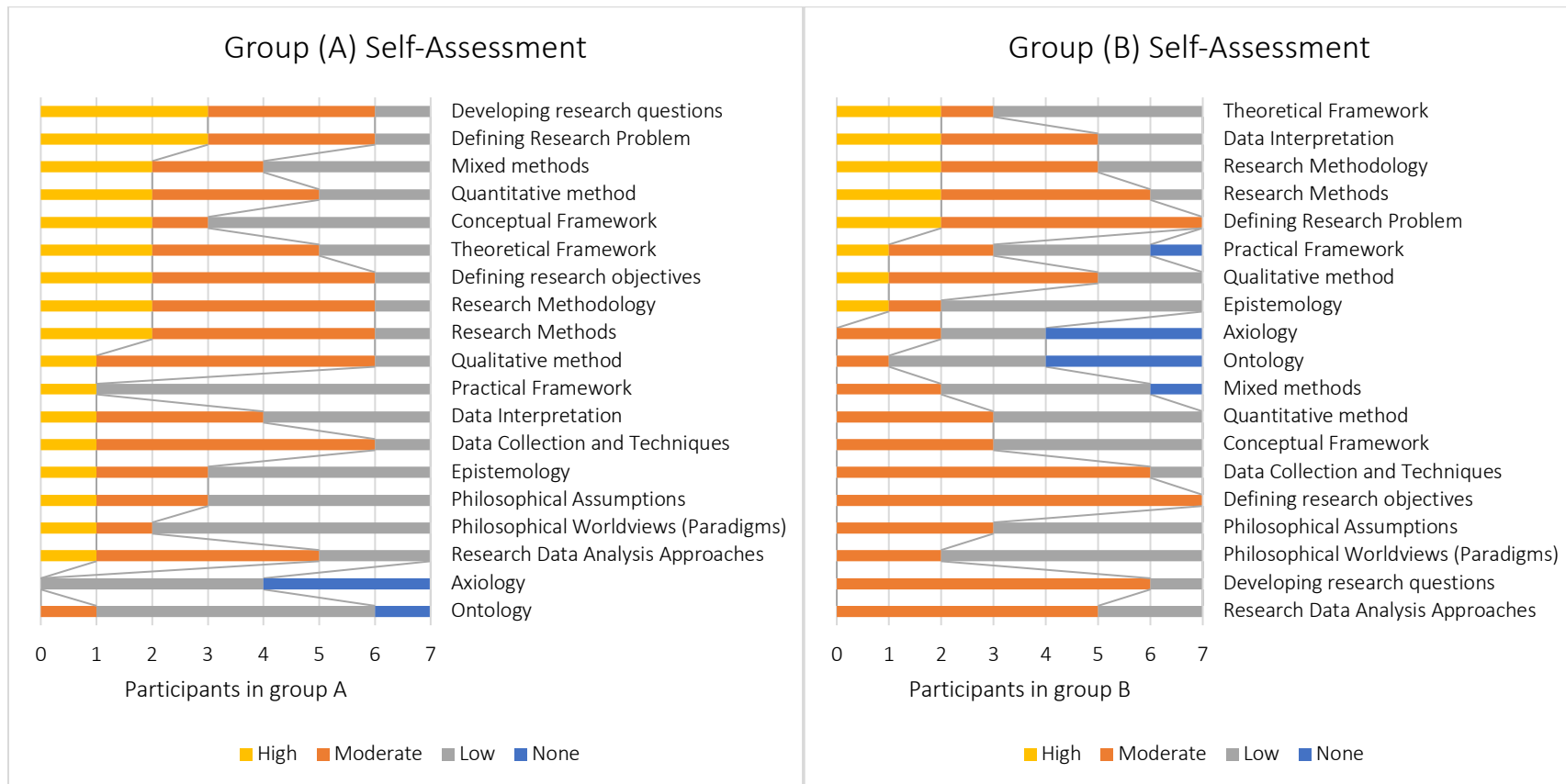


Figure 61. Self-assessment of both group A and B about their knowledge of some research concepts

Figure 62 shows as a whole, novice researchers reported having the highest levels of knowledge in defining research problems, theoretical frameworks, research methodology and research methods. Knowledge of practical frameworks, axiology, ontology, and philosophical worldviews (paradigms) had the highest number of low or no knowledge ratings.

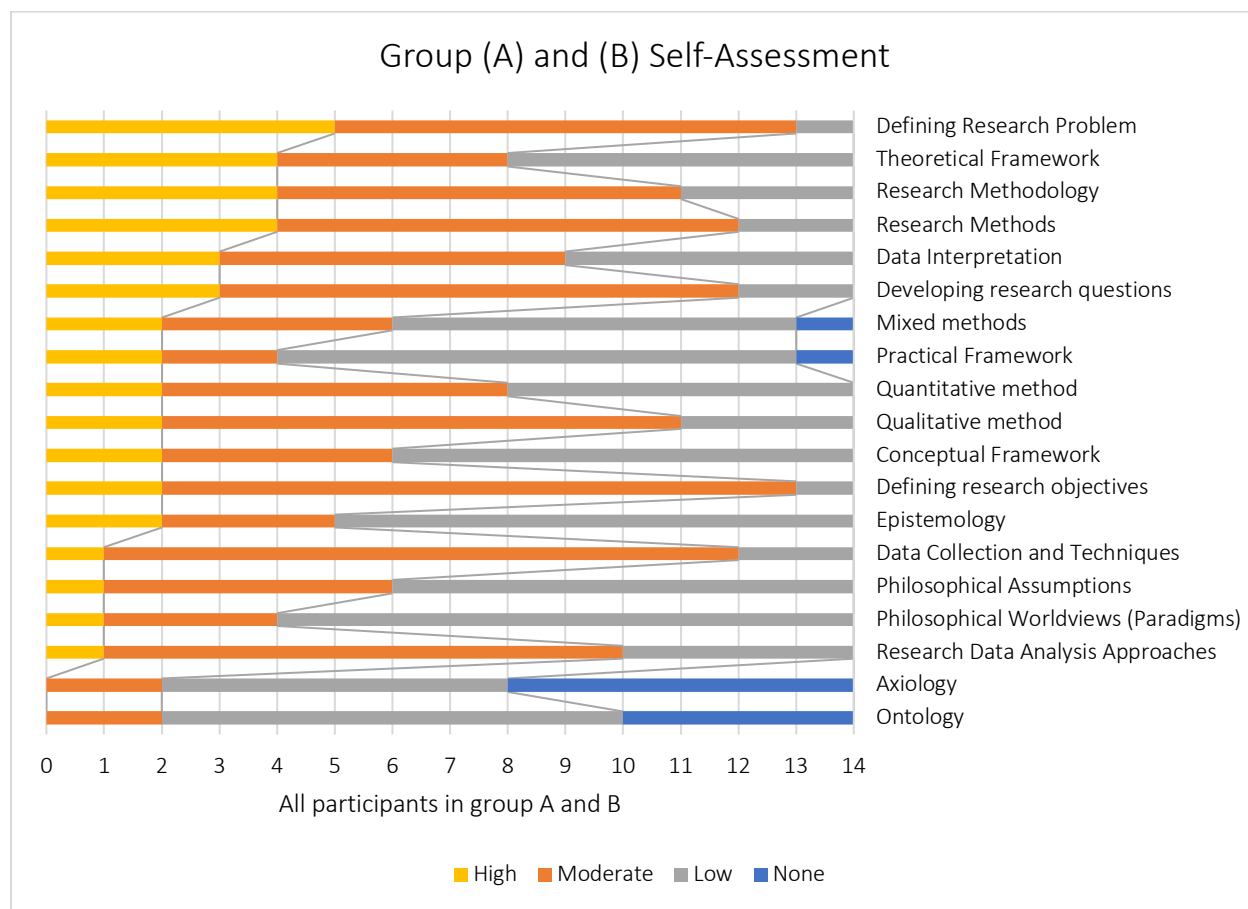


Figure 62. Self-assessment of the novice researchers about their knowledge of some research concepts.

The questionnaire data were used to divide the novice researchers into two groups. Half of the participants (7 novice researchers) were found to have recently published scholarly work; the other 50% had not submitted any publications. Data also showed that ten novice researchers were

studying in the social sciences compared to 4 novice researchers in the natural sciences. There was also a difference in the number and the nature of the research courses they each completed. Ultimately, based on these data, the participants were divided into two groups: Group A represented seven lower-level novice researchers who had not yet published, and Group B represented seven higher-level novices who had between 1 and 4 publications. See additional descriptions of each group at the end of this section for more information on the groups.















It should be noted that the process of dividing the two groups that structured this study does not make it an experimental study, meaning that this study does not investigate the effect of one variable on another in a group of people. However, it provides deeper data by describing the experiences of a group of people in two groups that share similar characteristics in a different set of structures. The comparison between the two groups and across novice researchers adds a deep meaning and other dimensions, which have already been extensively explained. This procedure is one of the phenomenological studies' features, especially in studies that require a detailed description of many people's experiences towards a particular aspect (Heidegger, 2005a; Moustakas, 1994b; Pietkiewicz & Smith, 2014).

The participants in both groups were novice researchers according to the characteristics considered in this study, and the data they provided in the demographic and research background questionnaire contains rich and inconsistent comments about their understanding of the three elements. Therefore, in terms of the general characteristics of the participants there is homogeneity; For example, all of the participants are PhD students who have taken research courses, enrolled in institutes of higher education, and are required to complete a dissertation, but in terms of their understanding of the 3Ps, their answers indicate heterogeneous data. The results of the questionnaire indicated that half of the participants do not have scholarly publications while

the other half have scholarly publications. Since the problem of this study revolves around the lack of understanding of novice researchers in the 3Ps, which, as reflected in the literature, undermines confidence in the rigor and trustworthiness of their research, the researcher took the scholarly publishing of the participants as a factor in the classification of the two groups in order to gain in-depth perceptions of the group that has scholarly works versus the other group about the 3Ps and their impressions of the advance organizer of the 3Ps.

Table 20 shows a comprehensive array of novice researchers, their demographics, research experiences, and research courses they have studied. The top part of the array, shaded in blue, shows Group A researchers, while the bottom part, shaded in green, shows Group B researchers. Not only are qualitative, quantitative, and mixed-methods research courses enumerated, other research courses that do not fit neatly into these categories are counted and listed. All names, institutions, and persons mentioned in this study are pseudonyms and have no relation to the actual novice researchers. These names are compiled from the Most Popular Names in America website. Usually, adding names in a sentence makes it easier for the reader to follow the description in an organized manner, especially when linking specific citations between novice researchers. Therefore, the researcher preferred to use pseudonyms for the novice researchers instead of using symbols or codes that might cause blurring of the meaning of the sentences.

*Table 20. A comprehensive matrix of the novice researchers in each group, their demographics, and research experiences.*

G	Pseudonyms	Age	Research Publ.	Field of research	Years of research practice	The number of research courses				
						Qual	Quan	Mixed-M	Other research courses	
	Emma	30 to 39	0	Social Science	3	3	3	1	1	Feminist Inquiries
	Jennifer	20 to 29	0	Social Science	1	1	1	-		
	Daniel	30 to 39	0	Social Science	5	3	5	3	1	Ethnographic inquiry
	Olivia	40 to 49	0	Social Science	3	1	2	1		
	Susan	30 to 39	0	Social Science	7	4	2	-	1	Research Design
	Isabella	50 +	0	Natural Sciences	3	2	1	-		
	Sophie	30 to 39	0	Natural Sciences	1	1	2	3		
	Linda	40 to 49	4	Social Science	14	2	1	1		
	Ava	40 to 49	1	Social Science	1	4	3	-		
	Richard	30 to 39	1	Social Science	2	3	8	-		
	Charlotte	30 to 39	3	Social Science	3	1	1	1		
	Margaret	30 to 39	1	Social Science	8	3	3	-	2	Dissertation Seminar Narrative inquiry
	James	30 to 39	1	Natural Sciences	6	1	3	-		Research Inquiries
	Elizabeth	30 to 39	3	Natural Sciences	3	1	2	-	1	Data Literacy

 Group A

 Group B

### Interviews with each participant

Interview dates were scheduled for both parties; all interviews were conducted online via the Zoom platform. It was planned that the interview for each person would take an hour, but some interviews took longer, with the interviewee's consent. The following two sections present thematic results of the novice researchers' interviews, responding directly to the third and fourth research questions.

The following part explains the second step in the interview, as shown in Figure 63, which answers the second research question:

- What are the novice researchers' perceptions of philosophical assumptions, paradigms, and praxis in research?

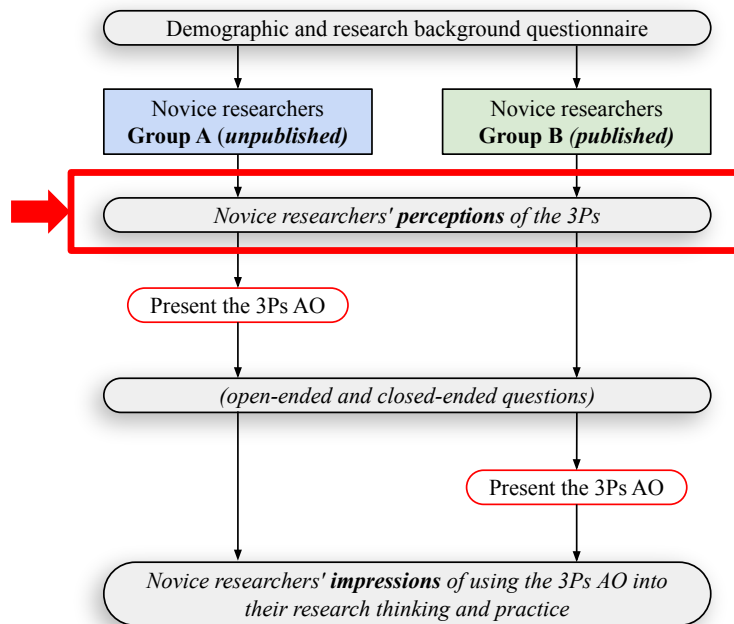


Figure 63. The second step of the novice researchers' interview structure.

### **An exploration of novice researchers' perceptions of the 3Ps that contributed to answering the third research question**

The novice researchers first responded to a set of questions exploring their perceptions about the 3Ps. These data were informative, with each interview taking an average of approximately 90 minutes, totaling to 1,260 minutes for all 14 interviewees. That time included some activities during the interview, such as open-ended questions, reviewing the 3Ps AO, and an accompanying explanation. The interviews generally consisted of 22 questions. The main starting point for conducting interview was the first interview questions on philosophical assumptions, paradigms, and praxis. These questions were intertwined in the overall research structures as explained in the literature chapter. As shown in figure 44 initial questions were asked of participants in both groups, prior to either transitioning into a review of the AO (Group A) or transitioning into open- and closed-ended questions about research experiences (Group B).

In the second part of the interview and as shown in Figure 63, the researcher asked the following question to each novice researcher in the interview: **What is the actual starting point of conducting research? (How do you to start a research project?)**

The novice researchers' answers focused on the following themes:

- Identify what meets my curiosity and interests
- Identify a research problem
- Identify research questions
- Identify a gap in the literature
- Identify a general idea
- Identify what interests my supervisor

Table 21 shows the novice researchers' responses in both groups and the common themes in their answers, which are listed in the table from most common to least. In Table 21, the researcher added quotes from some of the novice researchers while making some slight editorial adjustments to some of the answers without changing the meaning. Adding the novice researchers' sayings or quotes to the analysis is acceptable in qualitative studies, especially studies describing people's experiences and expressions, to convey the novice researcher's voice as much as possible. Bogdan and Biklen, (2006), mentioned that sometimes we need to make the novice researchers' voices shout in the text and for their thoughts and responses to be clear to the reader, which could sacrifice in increasing many pages but adding more sense (Corden et al., 2006; Lingard, 2019).

*Table 21. The actual starting point for conducting research for novice researchers*

<b>The actual starting point for conducting research for novice researchers</b>		
<b>Quotes from Group A</b>	<b>Themes</b>	<b>Quotes from Group B</b>
<i>I start looking at literature. Generally, I tend to have an idea of the field of interest that I'm interested in. (Emma)</i>	Identify what meets my curiosity and interests	<i>I start conducting my research by selecting the topics I am interested in. (Ava)</i>



The actual starting point for conducting research for novice researchers		
Quotes from Group A	Themes	Quotes from Group B
<p><i>Some kind of curiosity about a topic.</i> (Olivia)</p> <p><i>My true starting point will be to actually go to the university library website and try to search for some probable topics, read the literature about what research topics interest me.</i> (Olivia)</p> <p><i>I would start with where my passions lie and where my deep interests lie.</i> (Isabella)</p> <p><i>It's about things that are most meaningful to me. And so, that's why I feel like I gravitate to a specific project or a specific area of research.</i> (Isabella)</p> <p><i>It is starting with curiosity, wanting to learn more about a subject, a situation, an experience. I think the first stage is to be curious.</i> (Susan)</p>		<p><i>I should do something that I want to devote myself to for the rest of my life. So, the interest is my priority.</i> (Ava)</p> <p><i>I'll start with the one that speaks to me the most. And that is, the interest, the excitement, the curiosity.</i> (Richard)</p>
<p><i>I think the starting point should be to identify the research question or research problem.</i> (Daniel)</p> <p><i>Starting the process of a research project is identifying a problem.</i> (Susan)</p>	Identify research problem	<p><i>To find some phenomenon, issues, or gaps.</i> (Charlotte)</p> <p><i>The most important part is to try and find some research inquiries, research problems, and generate the research questions.</i> (Charlotte)</p> <p><i>Identifying a problem and gap in the literature.</i> (Elizabeth)</p> <p><i>You'd see a problem, you'd see a problem in practice, you'd see a gap in the literature, you'd see an opportunity to expand our knowledge in the field.</i> (Margaret)</p>
<p><i>The starting point should be to identify the research question or research problem.</i> (Daniel)</p>	Identify research questions	<p><i>Identifying the problem... the question comes after that.</i> (Linda)</p> <p><i>Try and find some research inquiries, research problems, and generate research questions.</i> (Charlotte)</p> <p><i>Identifying the problem... the question comes after that.</i> (Linda)</p>

The actual starting point for conducting research for novice researchers		
Quotes from Group A	Themes	Quotes from Group B
		<i>It starts with identifying a question.</i> (James)
		<i>[this sounds] textbooky... You begin with a question.</i> (Richard)
		<i>A research project always starts with the literature review.</i> (Elizabeth)
<i>Identify what the gaps are.</i> (Emma)	Identify a gap in the literature	<i>Found some phenomenon, issues, or gaps.</i> (Charlotte)
		<i>And then starting to conceptualize... what direction you think that your research might take... to address that problem, or close that gap, if you find a gap.</i> (Linda)
<i>The starting point of the research is to have a broad idea or topic for a general field that I am interested in.</i> (Jennifer)	Identify a general idea	<i>I have found some phenomenon, issues, or gaps... and it would be of a general phenomenon</i> (Charlotte)
<i>First of all, I think about ideas. And what topic I want to choose for my research.</i> (Sophie)		
<i>I have to find if our department... whether our professors or my advisor has an interest, or whether my interests align with their interest, or whether they can provide some courses, or... some resources for me to do something related to [my area of interest].</i> (Jennifer)	Identify what interests my supervisor	<i>If I want to do research related to a specific topic, then I have to find out if our department... whether our professors or my advisor has an interest, or whether my interests align with their interest.</i> (Charlotte)
<i>I have been very lucky to have really incredible models of qualitative researchers who make research sound not as scary or boring, or tedious. My dissertation chair and advisor always says, "You have to embrace the mess."</i> (Susan)		

Figure 21 shows areas where at least two novice researchers echoed each other's opinions. There were also other individual considerations that some of the novice researchers shared when starting the research, like the ones below, which didn't fit in with what others said.

For instance, Margaret from group B thought of the actual starting point of conducting research in terms of available study populations. She said, “I think you find the people who are willing to participate [first].”

Susan from group A offered more information beyond her quote in the above table. She disagreed with what she saw as the common approach, to identify a gap or problem in the literature. Instead, she points to curiosity. Susan said, “I sound, I feel like I sound silly saying that, because all of the textbooks say, ‘Identify a problem,’ um... ‘there is a gap in research,’... But I do think that, starting a research project is to be inquisitive and curious about an experience or concept.” Charlotte from group B, on the other hand, was interested in what motivates a person to start research. She said, “Initially, when I start a project, I will find the research inquiries... like what is the purpose to do research?”

Generally, research novices voiced similar ideas about the ways to start a research project. They identified personal interests, the creation of problems and questions, the identification of literature gaps, and the interests and resources of their own institutions as key in starting a research project.

**The second question in the interview was, “what does having philosophical assumptions mean in research?”** Table 22 shows the respondents' answers to this question. The answers of the novice researchers illustrates their doubts about the knowledge of the philosophical assumptions. Novice researchers often combined that doubt with speculation about the meaning of the term, or sometimes they expressed this doubt with a feeling of tension or irritation for philosophical assumptions, and this impression is consistent with what was mentioned by Gray (2017), Kivunja and Kuyini (2017), and Sefotho (2015). Overall, novice researchers saw philosophical assumptions as "their way" of theorizing, their beliefs, or a means of producing

knowledge. Whereas *philosophical assumption* as defined in the research literature is a theoretical framework covering the researcher's understanding of the research problem (phenomenon) and explores the best way to investigate it to find the reality, and in philosophy in general, there are many assumptions, but in research, the focus is on three types which are the ontological, epistemological, and axiological assumptions (Crotty, 1998; Rust et al., 1999).

Table 22. The meaning of philosophical assumption in research for novice researchers

The meaning of philosophical assumption in research for novice researchers		
Quotes from Group A	Themes	Quotes from Group B
<i>I don't know, I do not have a correct answer probably, but... I think that our professor always talks about that as the theoretical foundation of the research. (Daniel)</i>	I don't know, but	<i>I have heard of making assumptions or hypotheses of research studies. But philosophical... um... I am not very sure about that part. (Charlotte)</i>
<i>I'm not sure I know. [repeats question] I am going to take a whack at this, because I don't have like, I would love to have notes somewhere... For me I am thinking about it, I'm not saying this is correct, I guess I would be thinking about it as my theorizing, my, similar to a hypothesis. (Emma)</i>		<i>I designed an instructional intervention based on what theories... or based on the constructivism... or connotative... so, they have some philosophical foundations in their research work. Does that mean the philosophical assumption? I am not sure. (Charlotte)</i>
<i>I haven't heard about it... but, reading the word "philosophy" is like something general. It reminds me of the famous philosophers, like Plato, Aristotle. (Jennifer)</i>		<i>Ohhh... I hate philosophy! I hate it! with all my heart, soul, and mind. (Elizabeth)</i>
<i>I have never heard of the term philosophical assumption, so even this answer is going to be an assumption... I really... maybe, you know, some kind of an assumption... (Olivia)</i>		<i>I feel that has been a huge gap in my research abilities so far, is understanding kind of the philosophy behind, um... you know... why we are even looking at the phenomenon. Why we even want to study it. And what's the best way for us to enact that study so that it can contribute to the body of knowledge, and kind of the, you know, well, I'm trying to think of another word that I would use, but philosophical, but ethical. (Linda)</i>
<i>I really don't know and I'm not aware of it. (Sophie)</i>		<i>To be honest with you, I don't really have philosophical assumptions. I guess, in terms of, like, I have a</i>
<i>This is a good question and a hard one!... I think, looking at the slide and seeing the word philosophical assumption makes me nervous... But I</i>		

The meaning of philosophical assumption in research for novice researchers		
Quotes from Group A	Themes	Quotes from Group B
<i>feel like the philosophical assumption is, you have an idea of how the project is going to go, or the motivations, the truths that you might hold, that frame your approach to the question, the concept, the "problem."</i> (Susan)		<i>philosophy of what learning means. I don't get to that level.</i> (Margaret)
<i>Philosophical assumptions are the theoretical foundations of research, which means, what is the theory behind the research.</i> (Daniel)		<i>This is a very hard question, I have to say, because I never, I honestly have never thought about philosophy until Creswell's "Five Approaches" book... I guess I just take for granted my own very positivistic approach.</i> (Richard)
<i>It's, my way of theorizing. This is how I theorize.</i> (Emma)		
<i>It's kind of like the theoretical framework. It's like, when we are writing a paper we have to find something to support, to help us identify the research phenomenon.</i> (Jennifer)	Means theoretical framework (my way of theorizing)	
<i>When I see or hear the phrase Philosophical Assumptions, I think about the theoretical underpinnings of my project and my training in that area, like the literature I've had to read and delve into to be able to interrogate on my own.</i> (Susan)		
<i>The philosophers provide us the knowledge about the world: what is the world like, how do we think about this world, and why do we think so?</i> (Jennifer)	Providing knowledge	<i>It is the worldview that you have about how knowledge is created. Yeah. How knowledge is created, or, how you view the... yeah. How you view the world.</i> (Elizabeth)
<i>The way that I am approaching the topic...and my own beliefs about it before, even before I read other people's opinions or definitions about something</i> (Isabella)	My own beliefs about the topic	<i>Our belief system... it is something that we can probably argue until we die about, philosophical assumptions... about things... so I guess it's something that we</i> (Richard)

Table 22 shows areas where at least two novice researchers echoed each other's opinions. There were also other individual considerations that some of the novice researchers shared when starting the research, like the ones below, which didn't fit in with what others said.

James from group B connected philosophical assumptions directly to worldview. He said, "I guess what I'll say is, my own philosophy is largely based on experiences of a certain population with a worldview, a certain worldview." Ava from group B, on the other hand, saw philosophical assumptions as coming out of the footsteps of her precursors. She explained, "I think I want to, um, um, follow the footprints of the precursors. And think about the ways to continue the study. And maybe, kind of, solve the problems that other researchers haven't solved. So. That is my assumption." (Ava, from group B).

Generally, research novices expressed a lack of comfortability when it came to philosophical assumptions. As Elizabeth from group B remarked, "Ohhh... I hate philosophy! I hate it! with all my heart, soul, and mind." While most participants speculated on the nature of philosophical assumptions, few were quick nor confident to talk about what philosophical assumptions meant to them. Novice researchers answered about philosophical paradigms when they were discussing assumptions.

**The third question in the interview was about what it means to have a philosophical worldview in research.** Novice researchers' answers revolved around five themes: differentiating between assumptions and worldviews; concepts, values, culture, and ethics that guide one's perspectives; a few believed the concept of philosophical worldview in research revolves around how this world perceives; didn't know; some guessing the meaning. In general, novice researchers provided examples based on their belief that they represented the worldview. Table 23 shows these answers. Novice researchers tried to distinguish between assumptions and worldviews; paired gaps

in knowledge with speculation on synonyms; pointed to concepts, values, culture, and ethics with examples; and discussed worldview as a way of seeing.

Table 23. *The meaning of philosophical worldviews in research for novice researchers*

The meaning of philosophical worldviews in research for novice researchers		
Quotes from Group A	Themes	Quotes from Group B
<p><i>The difference might just be that the assumptions include personal biases or are based on lived experiences... So the worldview might be like a broader overall approach to research, and in a sense it feels like... the worldview is created as a result of the assumptions. (Isabella)</i></p> <p><i>The assumption as more subjective, and then the worldview is more objective. (Emma)</i></p>	Difference between assumptions and worldviews <sup>6</sup>	<p><i>Worldview may be the lens with which we look at the world, or the lens with which we... assess the knowledge or the experiences and events. (Elizabeth)</i></p> <p><i>I don't know. It's almost the same question. What's the difference between an assumption and worldview... just because I don't really explore that much, to me it is the same thing. What I was speaking about assumptions, it's the same thing. I would answer in the same way about worldview. (Richard)</i></p>
<p><i>Philosophical worldview... this isn't a term I have heard before, but I can give it a shot... Maybe worldview would mean... your viewpoint. I don't know. (Olivia)</i></p> <p><i>I have heard of the words separately. Put together "philosophical assumptions", I don't know what it means. Maybe you can explain later for me. (Daniel)</i></p>	I don't know, but	
<p><i>Philosophical worldview, I think about the concepts, values, and maybe even morals that guide one's perspectives... our meaning-making process. (Susan)</i></p>	The concepts, values, culture, and ethics that guide one's perspectives	<p><i>Worldview is very important to conducting research, you have to know what others have done... what is the uniqueness of your own research. (Ava)</i></p>
<p><i>Behaviorism. (Jennifer)</i></p> <p><i>I'd say probably constructivism. (Sophie)</i></p> <p><i>A lot of the work that I engage in is grounded in women and gender studies, so thinking about cultural</i></p>	Examples of worldview	<p><i>Would you say pragmatism? (Elizabeth)</i></p> <p><i>...from a culture. And, a perspective that... makes up a person's view of reality. But the assumption comes with... whatever it is, I don't know what to call it. You're making me think</i></p>

<sup>6</sup> After the researcher asked about the philosophical assumptions, some of the participants had some kind of confusion, so they tried to arrange their ideas in differentiating between paradigms and assumptions.

The meaning of philosophical worldviews in research for novice researchers		
Quotes from Group A	Themes	Quotes from Group B
<i>worldviews, so, understanding that marginalized people have a very specific cultural lens of navigating the world, thinking about one's own standpoint epistemology. (Susan)</i>		<i>now... I could have said, "Well, I'm going to take on this approach that's real Western academic." But the assumption part pushed me to the worldview. (James)</i>
		<i>Whether or not you see validity in certain research methods. So, if you have a philosophical worldview that emphasizes... hard data... numbers... you're going to really emphasize quantitative research, and you're going to look for statistical analyses rather than interpretation. Whereas, if you have a philosophical worldview that is more... open... gray... there's different kinds of interpretations, you may be more willing to look at the validity of qualitative data and qualitative analysis. (Margaret)</i>
<i>A paradigm is... how you perceive the facts. How you perceive the facts and knowledge. (Daniel)</i>	How we perceive this world	
<i>Worldview means how we perceive this world. (Jennifer)</i>		

In question three, the researcher asked about philosophical worldviews, and they answered that they did not know. However, when the researcher used the term “paradigm” as a synonym for worldviews, they answered that they knew and provided the following descriptions.

Sophie from group A said, *it's like the... like you believe, or the idea that guides your actions.* This is related to Daniel's idea that in the same group, *I think a paradigm is basically like the perspective of... maybe not very accurate... but I think a paradigm is basically like, how you perceive the facts. How you perceive the facts and knowledge.* Charlotte from group B saw paradigm in a larger sense, but still related to what the others had said,

*Just from my own point of view, I think it is like, a very big umbrella. It is, it can include... it's not just personal beliefs, it's like, the view you see of the world. The belief you see of the world... your personal*



*values and work value and life values, all of these values that you believe in...it means in the research, I think... every researcher, when they are doing the scientific research, they must have some, like, something that they stand for. (Charlotte)*

Isabella from group A connected the idea of philosophical worldview to a lens. She stated, “It's a much broader lens than the one that I might be looking through.” Emma, on the other hand, saw philosophical worldview as a means for acquiring knowledge on a certain topic. She explained, “The worldview is... having more knowledge about what exactly exists out there. More complete knowledge. And being able to draw a conclusion that is informed by actual data and research. And my assumption was just, what I believed, or what I hoped to find, or what I think I will find.” (Emma, from group A).

In response to the third question, novice researchers discussed philosophical worldview interchangeably with assumptions, searched for other words that could sum up worldview while pointing to potential examples, and talked about worldview as a way of seeing the world. Group A, “lesser knowledge”, had answers that reflected closely to the meaning of worldview. Worldview has been defined as, “The worldviews or general perspectives that break down the complex details of the real world as a general set of beliefs on which actions are based” (Avramidis & Smith, 1999).

**The fourth question in the interview was about theoretical frameworks in research.**

Novice researchers’ answers revolved around five themes: theoretical framework as a lens to view reality; distinguishing between theoretical and conceptual frameworks; foundations of thought; doubt about the topic but attempts to connect theoretical frameworks to other concepts; and theoretical framework as simply theory. See Table 24.

Novice researchers were asked to describe the concept of a theoretical framework. Their descriptions fell into the categories of lens to view reality, disambiguation between theoretical and conceptual framework, foundations of thought, I don't know but, and theory as used in study.

Table 24. Description of the theoretical framework by novice researchers

Description of the theoretical framework by novice researchers		
Quotes from Group A	Themes	Quotes from Group B
<i>A lens through which you see what is in front of you. Whatever your data is. (Emma)</i>	As a lens to view reality	<i>It's the flashlight. It's the lens. It's the way of looking at what you're going to do with your research and the types of answers you will find. (Richard)</i>
<i>What the research can be as a lens, can be analyzed through. (Isabella)</i>		<i>The lens with which you choose to look at the problem... it helps you narrow the focus on a particular problem. (Elizabeth)</i>
<i>It guides and frames every step of the research process... theoretical framework mirrors my own worldview, my own cultural, personal, political consciousness. (Susan)</i>		<i>The lens that you view your work through... helpful in crafting your study. (James)</i>
<i>Intersectionality... these different things that help to inform my process... conceptual framework relates more to methods, questions, and how I planned on responding to the question. (Emma)</i>	Difference between theoretical and conceptual framework	<i>This was one of the areas that I really struggled with, because I didn't understand conceptualization versus theoretical framing. (James)</i>
<i>It does appear that they could be the same thing. I'm not too clear. (Olivia)</i>		
<i>Like every other day, is it the conceptual framework or theoretical framework? This is where I know I am really shaky... today I feel confused. (Susan)</i>		
<i>Theoretical framework is a foundation for our thought, for us to build on our thought, to interpret the research phenomenon. (Jennifer)</i>	Foundation of thoughts	<i>Theoretical framework is the foundation for your study. (Ava)</i> <i>Theoretical framework. You build your own ideas based on the theories. The theories can support you to answer your research questions. (Ava)</i>
<i>I do not know these terms... difficult to differentiate between them ... But let me guess... theoretical framework... whether your research, whether you're doing a qualitative study, what kind is it? Is it phenomenological, or is it a case study?... so basically that becomes your theoretical</i>	I don't know, but	

Description of the theoretical framework by novice researchers		
Quotes from Group A	Themes	Quotes from Group B
<i>framework... it is that [which] your study is based on theoretically... that would be my understanding. (Olivia)</i>		
<i>I honestly do not feel like we learned the differences. So, this may not be related or useful to you. (Susan)</i>		
<i>I am being honest with you, so, I really don't feel like I learned the differences, because in my program, it was very specific, you are doing ethnography or you're doing a philosophical paper, and if you do that, you go to a different department, so, all of our methods have been specifically qualitative. And then they threw in quantitative, and we were like, numbers?! (Susan)</i>		
<i>I'm not confident in my answers. (Susan)</i>		
<i>It is the theory that you employ in research. (Daniel)</i>	It is the theory used in the study	
<i>Theoretical frameworks are the theories. (Susan)</i>		

Table 24 shows areas where novice researchers echoed each other's opinions. There were also other individual considerations that some of the novice researchers shared when starting the research, like the ones below, which didn't fit in with what others said.

Two novice researchers connected theoretical frameworks to guidelines and rules, with one saying, "I think it's kind of theoretical guidelines to, uh, the, the theoretical rules" (Charlotte, from group B), while another remarked, "I think of theoretical framework as just a way to organize ideas, maybe explain phenomenon" (Margaret, from group B).

Another novice researcher, Sophie from group A, connected theoretical frameworks to measurement. She stated, "It's what guides your research and determines what you're going to be measuring and, um... it's also about the statistical relationships that we look for in your research."

The following question was posed as, “**What are the research methods?**” and the novice researchers presented their answers in a varying fashion. Some of them responded by mentioning the types of research, and others defined the concept of research (i.e., what is meant by it), and in Table 25 the most prominent answers of the novice researchers in both groups were included.

The novice researchers presented their answers differently; some of them answered by mentioning the types of research, others defined the concept of research (meaning what is meant by it). Table 25, shows the most prominent answers of the novice researchers in the two groups about the meaning of the research methods. Table 26 shows the most prominent answers of the novice researchers about the types of research.

*Table 25 Answers of novice researchers about what research methods are*

<b>Responses from low experience novice researchers in Group A about what research methods are</b>	<b>Responses from higher experience novice researchers in Group B about what research methods are</b>
Research methods are strategies that you use to respond to a research question. (Emma)	It is looking at the various ways in which data is collected. (Elizabeth)
Research method is the kind of tool you choose to use for research. (Isabella)	The research methods are a way that you can conduct your study or conduct your further inquiry into, an ethical way of approaching this work. (James)
Research method refers to a typical research method under the research methodology. (Daniel)	I am not sure if I can easily define the research method because I feel confused sometimes between it and the methodology .... but Method, I might define as more of the way we operationalize this methodology. (Linda)
	I think of them as ways to collect data. (Margaret)
	A research method is a specific technique used in the process of working with the data, e.g., content analysis, discourse analysis, ANOVA. (Richard)
	I think research methods are primary for the researchers to conduct a study, they include

<b>Responses from low experience novice researchers in Group A about what research methods are</b>	<b>Responses from higher experience novice researchers in Group B about what research methods are</b>
	<p>experiments, surveys, observations, tests. Methods help find ways to solve the research problems. (Richard)</p> <p>Research method would more like a strategy or approach to collect and analyze data. (Charlotte)</p>

Novice researchers were asked to provide an example of research methods. Their responses are listed below in Table 26.

*Table 26 Answers of novice researchers to provide examples of research methods*

<b>Responses from low experience novice researchers in Group A about providing examples of research methods</b>	<b>Responses from higher experience novice researchers in Group B about providing examples of research methods</b>
<p>Quantitative, qualitative, mixed methods. There's one I can't think of. (Sophie)</p> <p>I think there are two types of research methods qualitative and quantitative. (Olivia)</p> <p>Generally, there are three types of research methods: quantitative, qualitative research methods, and mixed methods. (Jennifer)</p> <p>Like you can have qual methods, you can have quant methods, you can have mixed methods where you use a variety of different methodology. (Emma)</p> <p>We definitely can categorize them into three types: qualitative methods, quantitative methods, and the third one is, just like put them together, mixed methods. (Daniel)</p>	<p>I think of it as qualitative and quantitative... Like qualitative research methods, observations, interviews. For quantitative, like surveys. (Ava)</p> <p>They have the qualitative research methods, the quantitative research methods, the mixed research methods. (Charlotte)</p> <p>I would say five... examples... I might still be confusing research methods with, uh... data analysis methods. There's existing data, existing document review, and there's interview, and there's observation, and you may even include survey into that a little bit. So those are ways of conducting observational research, and those are components that make up observational research, but I think observational research is really just one research method. (Linda)</p>

After the novice researchers provided responses to the types of research methods, they were asked about the difference between the research methods to reach a deeper exploration of the

understanding of the novice researchers about the nature of the research methods. However, the novice researchers provided answers and examples that reflected their perceptions about the difference between research methods. Table 27 shows the most prominent answers of the novice researchers in both groups.

*Table 27 Answers of novice researchers about the difference between the research methods*

<b>Responses from low experience novice researchers in Group A about the difference between the research methods</b>	<b>Responses from higher experience novice researchers in Group B about the difference between the research methods</b>
<p>I think qualitative approaches to research are intimate and personal, obviously, because it involves people, but that also is true of quantitative methods, I think the assumption there is, it's just numbered, it is sterile, but I do think that quantitative methods help answer questions that work in tandem with qualitative work. (Susan)</p> <p>It depends on the data you collect...the amount of data collected, if it is tables and a lot, then this is my quantity, and if it is a description and pictures, then it is qualitative... I think this is what I know about these types... I don't know, maybe I'm wrong. (Sophie)</p> <p>I believe quantitative would be when there's something that you can quantify, when you can put a number to it. That is when it becomes quantitative... Whereas qualitative research method would be more of, exploring and there are no right or wrong answers, where you are just taking your participants' point of view, perception, feeling, experiences. (Olivia)</p> <p>For the quantitative research methods, we always use the technique or the method of experimental design. After the qualitative research, we can see we can reach a conclusion, like, does A cause B, or have a relation... for the qualitative research</p>	<p>This is a difficult question and I'm not sure if there is a difference. (Margaret)</p> <p>By looking at the type of questions I would say. Some sort of questions, if you were to ask, what are the trends... It will probably warrant a quantitative approach. If you're asking, what is the lived experienced of A in [place name], that will be qualitative. And, in comes the mixed methods. And I actually have not really studied that. I am really curious. I keep hearing from everyone that it is so hard, that I probably shouldn't start. I would like to explore that more. (Richard)</p> <p>The difference between qualitative and quantitative is really about how deep I am going into the information or the interviews. Not necessarily numerically. I'm not so concerned about the number of times somebody had something happen, but more so their depth of experience and what they can describe for me and really illustrating that for the reader. Versus a quantitative where they're really looking at information or data that is... about numbers, right, and how many times, something happens, quantifying things that can be higher number wise, but with less detail and description and more focus on numbers. (James)</p>

Responses from low experience novice researchers in Group A about the difference between the research methods	Responses from higher experience novice researchers in Group B about the difference between the research methods
<p>maybe, we use something like interview, focus group, and we reach the conclusions, but it's, but we interpret the conclusions in our own way... maybe... not a settled or accurate conclusion. (Jennifer)</p> <p>With quantitative, there's a very... rigid approach. I feel with qualitative research you might have some ideas about what you think, but I feel as though when you're doing the research, other things come out of it that you might not be expecting. I don't think it's as concrete I want to say. (Isabella)</p> <p>So, mixed methods, uh, it could be a mix of the qual and quant together. The quant, I think about those as using... ways to think about relationships. Sometimes it's more you use numbers, and you use things like R and SPSS. When I think about qual methods, I am thinking about interviews and discourse analysis and working more with words and language and humans. And then quant is a little bit removed from human interaction and working more with numbers and relationships. (Emma)</p> <p>Qualitative research is more about investigating students' subjective opinions or experiences. But if we conduct quantitative studies, you find that there are lots of statistics proving the relationships, either can be causal or correlational relationships. So, quantitative is using statistics to test hypotheses or proving some relationships. The qualitative is more descriptive. (Daniel)</p>	<p>I think for the qualitative research methods, it's based on the people's... words, they use their languages to describe some phenomenon, some issues. For the quantitative research methods, basically we can use structured survey, or we can do the very the structured rubric or observational forms to get the quantitative data in the certain time framework. I think the mixed methods is more comprehensive and also... can cover more information than the quantitative or the qualitative. (Charlotte)</p> <p>Like, quantitative methods. Surveys. Always use SPSS or SAS. So these statistical, solving, statistical ways to solve the problem. Um... for qualitative research methods, we normally use a lot of field notes and... we interview people... like what you're doing now, we record people's voices and visual images. So, these things, I think they are quite different, so it's easy to differentiate. (Ava)</p>

In the question about distinguishing between research methods, Elizabeth from group B mentioned that she suffers from great confusion in knowing the difference. She mentioned an example that she recently encountered during her comprehensive exam. One of the questions was

to explore research methods in education and when she searched in the literature on what people perceive as research methods, she encountered a significant challenge in finding the answer. However, she realized that each source has a different understanding of what research methods are, where some mention narrative, ethnography, case study, or phenomenology as methods, and others said things like interviews, observations, document analysis, and focus groups. In the end, she took the perspective that she could not answer the question.

Data for the first step in the interview showed that novice researchers in both groups had similar perceptions about their understanding of the 3Ps. In terms of the actual starting point for conducting research, their responses focused on various topics such as: starting with what satisfies the curiosity and interest, defining the research problem, defining the research questions, identifying a gap in the literature, defining a general idea, and identifying the interests of the thesis supervisors. As for their answers about the meaning of having philosophical assumptions in the research, most novice researchers' answers in both groups expressed their doubts about knowledge of the philosophical assumptions. Participants combined suspicion and speculation about the meaning of philosophical assumptions, and more than half of the participants expressed a sense of tension and anxiety about the philosophical assumptions in research. Three of the participants in Group A (not having publications) mentioned answers that hover around the correct meaning of the philosophical assumptions mentioned in the literature, as their answers focused on the meaning of the theoretical framework ("my way" of theorizing). In regard to the meaning of having philosophical worldviews in research, novice researchers' answers focused on five themes: the distinction between assumptions and worldviews, worldviews as a culture, and ethics that guide one's perspectives; a few novice researchers from group A believed the concept of philosophical



worldview in research revolves around how this world perceives; some did not know, and some guessed at the meaning.

In general, the novice researchers' perceptions of their understanding of the 3Ps in both groups revealed commonalities, and experience in publishing did not make any difference between them in the data given in this stage.

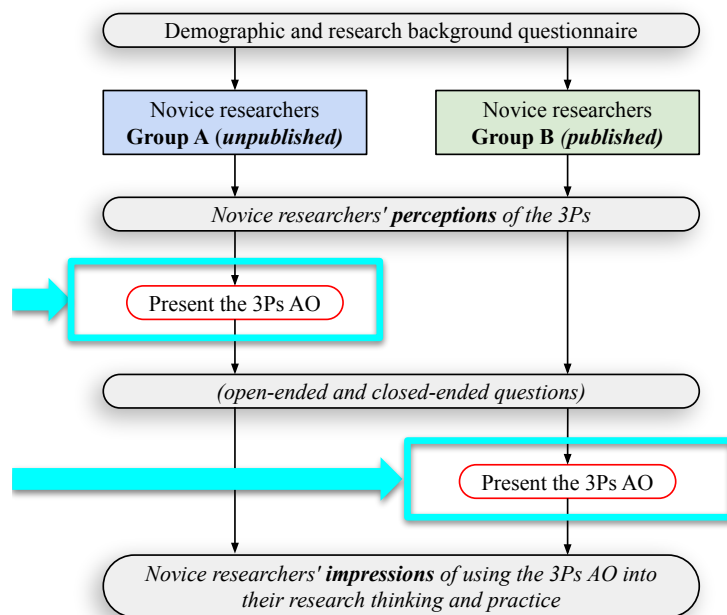


Figure 64. The 3Ps AO review step within the interview steps.

Since interviews were conducted online, a link for the novice researchers to view the 3Ps AO was provided. All novice researchers have full access to, and may control and review the 3Ps AO from their device, meaning that each novice researcher was able to zoom in and out and navigate the 3Ps AO independently. The review of the 3Ps AO started with the research providing a link and the following comment, “*I am going to share a link with you about a non-interactive visual design, and I would like you to review it yourself from top to bottom for ten minutes—Explore and dive into it, then we will come back for some questions.*” All novice researchers

adhered to the review instructions, keeping to the 10 minutes, with no difficulties or technical issues in viewing the 3Ps AO.

After completing the review of the 3Ps AO for group A, the novice researchers entered a link to answer the open-ended and closed-ended questions that represent the second step in the interview as shown in Figure 65. The researcher shared the link with the novice researchers with a password that changed after each interview. There were instructions when entering the test page to not use any sources during the session, and answer the questions in the order as they appear, as it was not possible to return to the previous question. The time allotted was 15 minutes. Nevertheless, some requested a time extension due to their slow typing and this was granted. The procedure also applied to Group B, which answered these questions upon completing Part 1 and before reviewing the 3Ps AO.

The next part reviews the results of open-ended and closed-ended questions submitted to both groups with a difference in the time of submission, as the open-ended and closed-ended questions was presented in group A after they reviewed the 3Ps AO. In contrast, group B answered the open-ended and closed-ended questions before they reviewed the 3Ps AO. Figure 65 shows the order in which the open-ended and closed-ended questions was presented for both groups

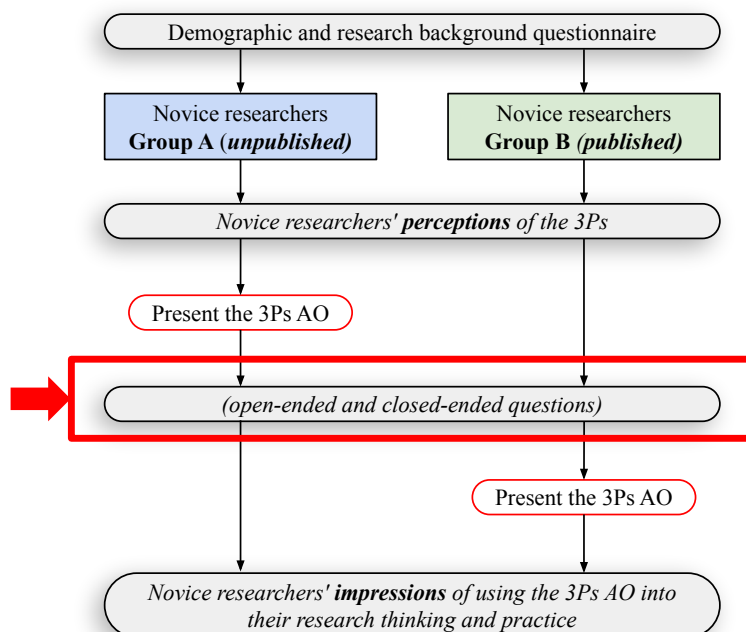


Figure 65. The open-ended and closed-ended questions as the third step of the novice researchers' interview structure.

The primary purpose of dividing the two groups was to provide a detailed description of the lesser experienced novice researchers who reviewed the 3Ps AO before and as part of the open-ended and closed-ended questions and the more experienced novice researchers who reviewed the 3Ps AO after the open-ended and closed-ended questions.

Table 28 shows a comparison between the two groups' answers to the same questions. The first question in the test was: **What does the methodology mean in the research?** In general, the responses reflected understanding of this question, with the exception of two novice researchers in group A, whose answers spoke about *methods* and not *methodology*. These two novices were excluded from the comparison due to their lack of understanding of the content. Table 28 displays the answers of all remaining participants from the two groups, showing a clear difference in the expressions of the lesser- and more-experienced novice researchers across the two groups.

Table 28. The novice researchers' answers about what does the methodology mean in the research.

Responses from lower experience novice researchers in Group A about what the methodology means	Responses from higher experience novice researchers in Group B about what the methodology means
<p>Methodology gets into the specific steps for the process and why you have decided on these steps. For example, my method might be mixed methods and my methodology would give more information on whether I will do quant or qual first and why I decided to follow these particular steps. (Emma)</p> <p>The research methodology is the vehicle or housing component for these methods or tools in culling data. It is the vehicle I chose based on my values, assumptions, and training that grounds the interrogation of my/participant perspectives (subjectivities). (Susan)</p> <p>The research methodology is a sub-set of each of these methods. For example, you could have a qualitative study with interviews and observations as the methodology whereas you could have a quantitative study with surveys and experiments as the methodology. A mixed methods research would combine qualitative and quantitative methods. (Olivia)</p> <p>Research methodology is the way you understand and decide to approach your research, the technique that makes the most sense for your research. (Isabella)</p> <p>Research Methodology is more like a structure involving all the possible research methods. (Daniel)</p>	<p>Research methodology could be the way that research has been conducted in the past, all of the researchers' work that has led us to this point in time. (Linda)</p> <p>Research methodology is a broader, contextual approach to research. This area wrestles with or includes larger philosophical, ontological, epistemological aspects to studying a particular phenomenon of interest. (James)</p> <p>Research methodology is a more general term that may include research methods. (Margaret)</p> <p>Research methodology which gathers data numerically and often in a controlled setting is quantitative in nature, while research methodology that gathers data through words and in a naturalistic setting is qualitative in nature. (Elizabeth)</p> <p>Research methodology should be more specific, under the umbrella of research methods. It emphasizes how the research can be conducted systematically. (Ava)</p> <p>Research Methodology is broader than a method and it is the way of setting, approaching a study such that there is congruence between questions, data collection, and data analysis techniques and valid interpretations from the study are warranted. (Richard)</p> <p>Research methodology is a bigger scope that involves the researcher's understanding or belief on what research inquiry can be answered by what research approach/method. (Charlotte)</p>

*Table 29. The novice researchers' answers about what is the role of the paradigm in the research.*

Responses from lower experience novice researchers in Group A about what is the role of the paradigm in the research	Responses from higher experience novice researchers in Group B about is the role of the paradigm in the research
<p>Paradigms help you structure a plan of action and help you think about a starting point for where you might want to begin. (Emma)</p>	<p>I do not have a clear answer to this question. My best attempt would be that a paradigm may be thought of as the gold standard, of the ideal representation of a phenomenon. (Linda)</p>
<p>The paradigm of research helps you understand the worldview you are approaching the research from. Some of the research paradigms used in academic research are realism, positivism, constructivism, interpretivism, post-positivism and post-modernism. (Olivia)</p>	<p>Paradigm joined together aspects of research including the philosophical, ontological, epistemological and research method from a given philosophical underpinning. (James)</p>
<p>After exploring the provided graphic, I now understand that the phrase paradigm in research connects to one's worldviews in relation to the work (and broadly of course). I think this concept relates then to the theories that define/shape your research. The phrase worldview resonates with me more familiarly than a paradigm. (Susan)</p>	<p>A paradigm defines some of the philosophies, world views, and "rules" for the phenomenon. For example, supply and demand in economics or child development phases are pretty standard. (Margaret)</p>
<p>Paradigm is like worldview. It lays a foundation for research: why we think or interpret a research phenomenon in such a way. Different paradigms may lead to different interpretations on the results. (Jennifer)</p>	<p>The role of a paradigm in research is to help the researcher determine their understanding of how knowledge is generated. It is informed by their perceptions of the world. (Elizabeth)</p>
<p>Paradigm in research is related to the ideology and common thoughts and ideas in understanding the research. (Isabella)</p>	<p>The role is to see the meaningfulness researchers can gather from the data they collected. (Ava)</p>
<p>It is the lens through which we see reality, and it relates to the researcher's opinions and beliefs, and a key to justify his steps. (Daniel)</p>	<p>I have a hard time answering this question, I assume it asks about the philosophical paradigm. Maybe the scientific method is a research paradigm? The idea that we approach complex phenomena by observing them, stating hypotheses, testing these hypotheses, and then generalizing and/or creating new questions for further explorations. (Richard)</p>
<p>It is the beliefs and concepts. (Sophie)</p>	<p>Paradigm would be the researchers' perspective/value of world/reality. It related to how they interpret the reality/data. (Charlotte)</p>

The researcher asked the novice researchers to present their perceptions in a drawing about method triangulation and methodological triangulation. Some novice researchers provided their answers as shown in the next section, and others preferred to explain it verbally, which was included in the previous sections.

Linda from group B, as seen in Figure 66, saw the process of trying to understand a problem from a journalistic point of view. She explained that a journalist may gather data that is numerical yet need textual data to look “more in-depth.” She saw methods and methodological triangulation as a way to address the parts of questions that demand both numerical values but also in-depth looks.

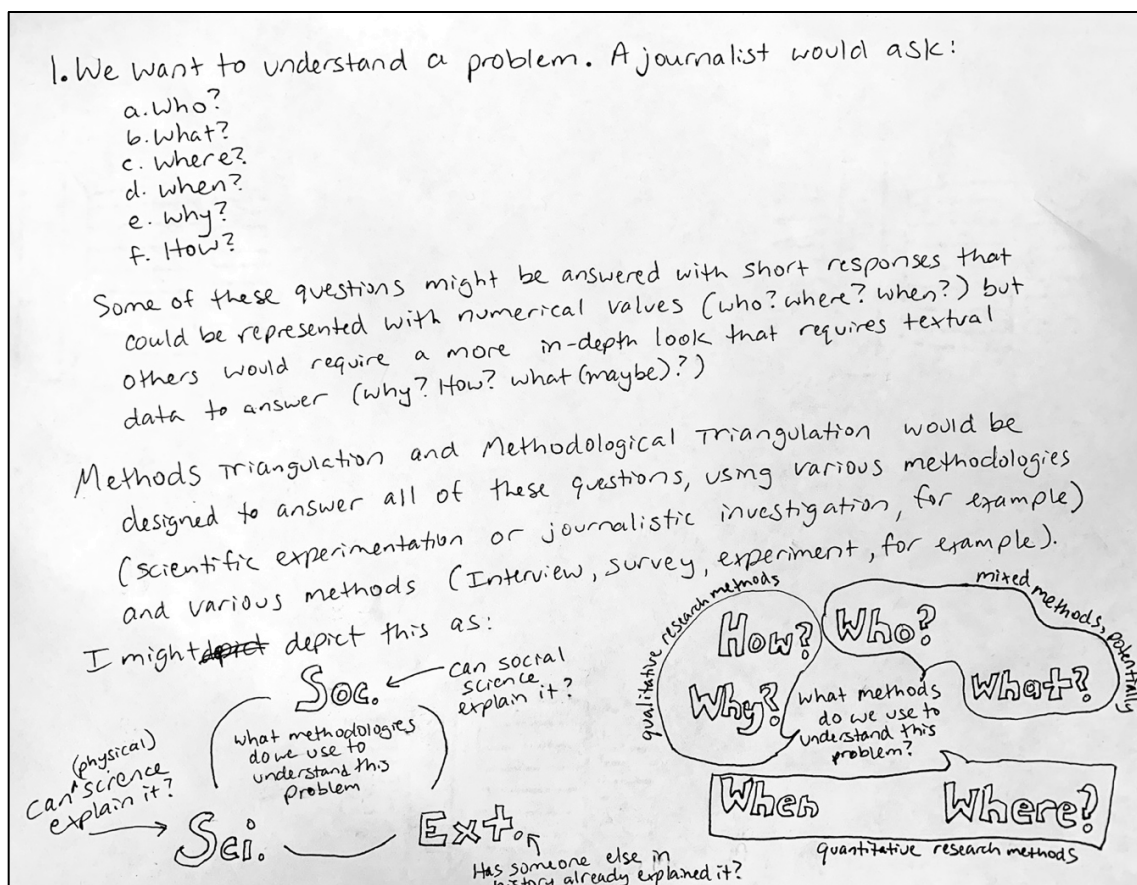


Figure 66. Linda's perception about the meaning of triangulation in method and methodology

Figure 67, shows how Isabella from group A saw methods triangulation as having three points: observation, survey, and interview. They also illustrated a connection between hypothesis, experiment, and conclusion with conclusion being connected to data.

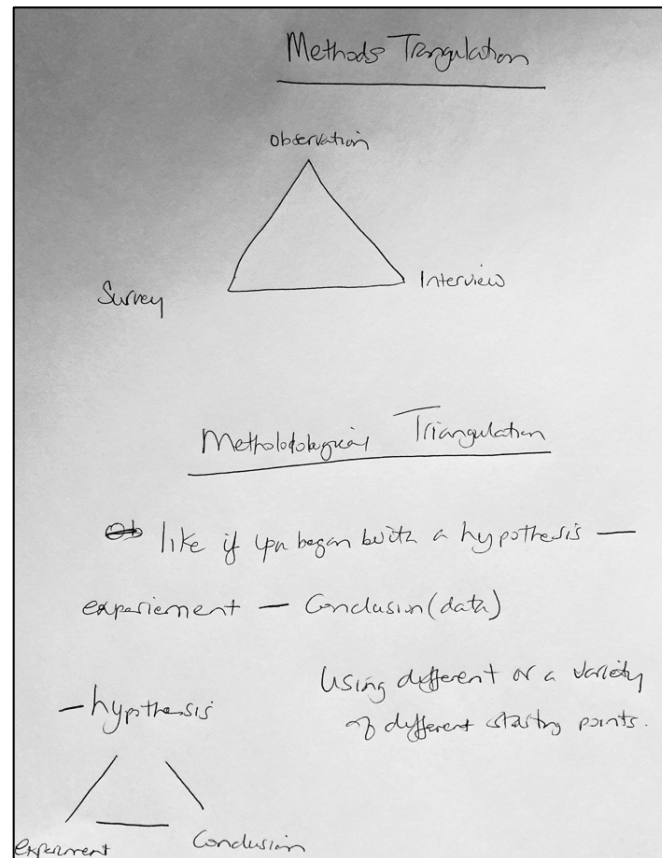


Figure 67. Isabella's perception about the meaning of triangulation in method and methodology

Figure 68, of Susan's drawing from group A, included a diagram using a martini glass and a straw. The straw was the analysis that penetrated the collected data, with worldview being the tip of the straw that collects the data, theory as the glass, and methodology being the base of the glass.

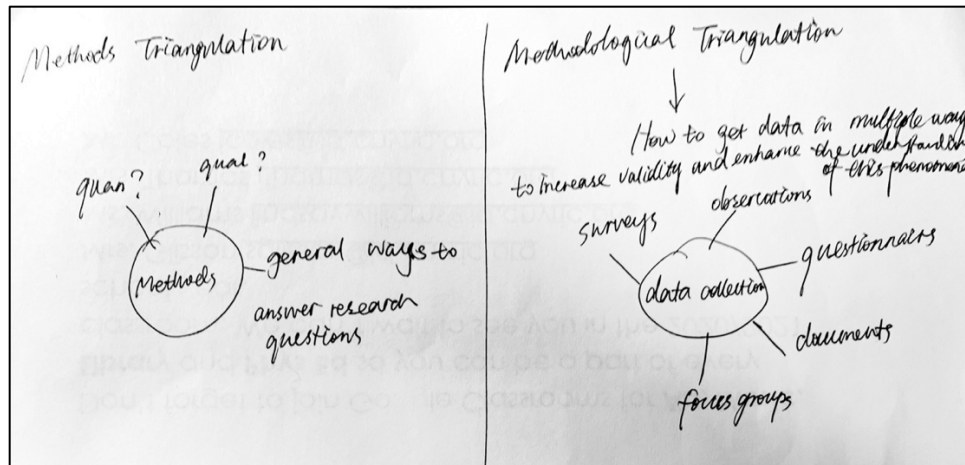


Figure 68. Susan's perception about the meaning of triangulation in method and methodology

Ava's diagram from group B (Figure 69) was more text-based than others. For methods triangulation, she identified quantitative and qualitative as methods to answer research questions. For methodological triangulation, she wrote that it is a process for getting "data in multiple ways to increase validity and enhance the understanding of this phenomena."

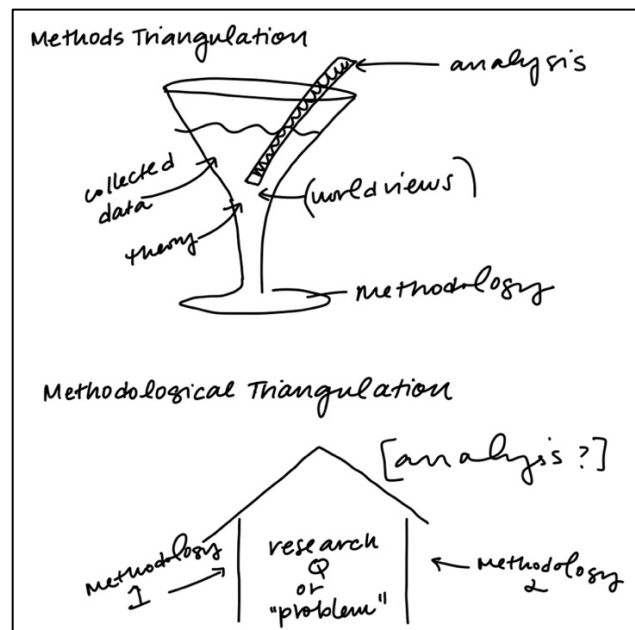


Figure 69. Ava's perception about the meaning of triangulation in method and methodology



Emma's diagram from group A (Figure 70) of methods triangulation showed interviews, surveys, and document analysis as leading into responses to research questions. For methodological triangulation, Emma showed that surveys can lead into interviews, and interviews can lead into observation.

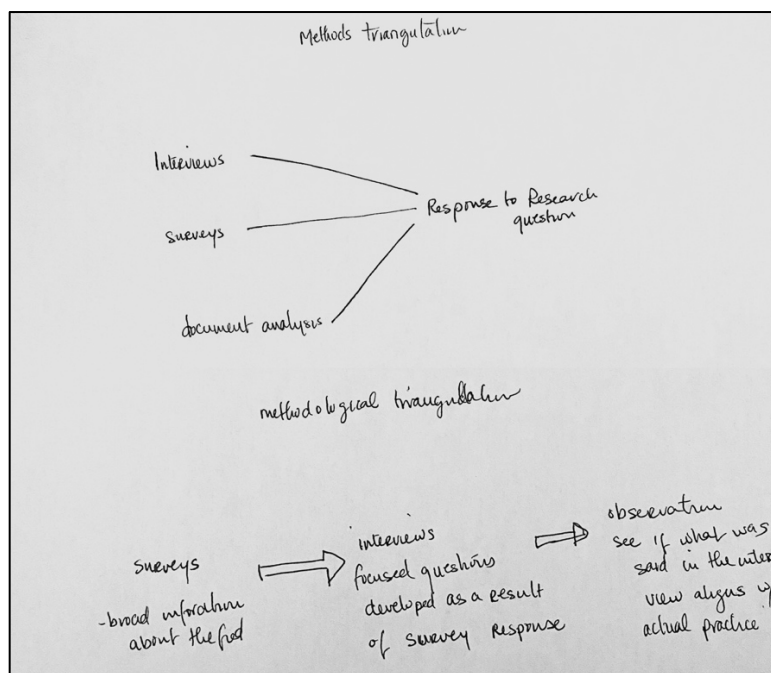


Figure 70. Emma's perception about the meaning of triangulation in method and methodology.

In general, the previously presented drawings show the perceptions of five novice researchers about the meaning of triangulation in method and methodology, and the rest of the novice researchers preferred to explain their understanding orally. Three drawings by novice researchers in group A showed somewhat similar perceptions of what was included in the 3Ps AO, which is consistent with what has been mentioned in the literature that methodological triangulation involves using more than one method to study a phenomenon. In contrast, methods triangulation includes more than one data collection tool to study a phenomenon. On the other hand, the drawings presented by the novice researchers in group B contained information that differs from group A; although their drawings were creative, they were inconsistent with the

previously mentioned concept of the difference between triangulation in method and triangulation methodology.

In addition to the previous question, all novice researchers were asked the following question: What is the role of the paradigm in the research? Their answers, as shown in Table 30, did not differ significantly across the groups. One difference found was that group B, the more experienced novice researchers, described a paradigm as a ‘set of rules for a phenomenon’, the “gold standard” or “ideal representation” of a phenomenon. In general, novice researchers talked about paradigm as a lens, worldview, perspective, and ideology.

The answers of the novice researchers from group A were close to each other. Most of their answers focused on the paradigm's role in research as the lens through which the reality to be studied is viewed. Although the paradigm definition is not explicitly presented on the 3Ps AO, their understandings fit closely with the Avramidis and Smith (1999) definition that worldviews or general perspectives break down the complex details of the real world into a general set of beliefs on which actions are based. On the other hand, three novice researchers from group B, who have at least one scholarly publication, stated that they do not have a clear answer to this question, and some others provided guesses and answers that differ from the definition of the paradigm mentioned in the literature. In general, the responses of group B tended to define the philosophical assumptions instead of paradigm. This confusion in the lack of understanding by novice researchers in group B of the difference between the terms paradigm and philosophical assumptions shows evidence that even researchers who have research experiences struggle to understand these terms; this also corresponds to what was found by Kivunja and Kuyini (2017), Kalman (2019), and Makombe (2017).

It should also be noted that four from group B, after being asked the paradigm's role in the research, asked the researcher to clarify the meaning of the paradigm. The researcher stated that this term paradigm is the same as the worldviews. Their lack of understanding of the meaning of paradigm seems to confirm the result of their self-assessment, which appears in Figure 61, as it shows that five of them selected low knowledge of philosophical worldviews, even though this group has a scholarly publication.

Table 30. The novice researchers' answers about what is the role of the paradigm in the research

Responses from lower experience novice researchers in Group A about what is the role of the paradigm in the research	Responses from higher experience novice researchers in Group B about is the role of the paradigm in the research
<p>Paradigms help you structure a plan of action and help you think about a starting point for where you might want to begin. (Emma)</p> <p>The paradigm of research helps you understand the worldview you are approaching the research from. Some of the research paradigms used in academic research are realism, positivism, constructivism, interpretivism, post-positivism and post-modernism. (Olivia)</p> <p>After exploring the provided graphic, I now understand that the phrase paradigm in research connects to one's worldviews in relation to the work (and broadly of course). I think this concept relates then to the theories that define/shape your research. The phrase worldview resonates with me more familiarly than a paradigm. (Susan)</p> <p>Paradigm is like worldview. It lays a foundation for research: why we think or interpret a research phenomenon in such a way. Different paradigms may lead to different interpretations on the results. (Jennifer)</p> <p>Paradigm in research is related to the ideology and common thoughts and ideas in understanding the research. (Isabella)</p> <p>It is the lens through which we see reality, and it relates to the researcher's opinions and beliefs, and a key to justify his steps. (Daniel)</p> <p>It is the beliefs and concepts. (Sophie)</p>	<p>I do not have a clear answer for this question. My best attempt would be that a paradigm may be thought of as the gold standard, of the ideal representation of a phenomenon. Applying this to research, I might guess that we researchers seek to design &amp; conduct research that lives up to the ideal, or the standard in our field. (Linda)</p> <p>Paradigm joined together aspects of research including the philosophical, ontological, epistemological and research method from a given philosophical underpinning. (James)</p> <p>A paradigm defines some of the philosophies, world views, and "rules" for the phenomenon. For example, supply and demand in economics or child development phases are pretty standard. (Margaret)</p> <p>The role of a paradigm in research is to help the researcher determine their understanding of how knowledge is generated. It is informed by their perceptions of the world. (Elizabeth)</p> <p>The role is to see the meaningfulness researchers can gather from the data they collected. (Ava)</p> <p>I have a hard time answering this question, I assume it asks about the philosophical paradigm. Maybe the scientific method is a research paradigm? The idea that we approach complex phenomena by observing them, stating hypotheses, testing these hypotheses, and then generalizing and/or creating new questions for further explorations. (Richard)</p> <p>Paradigm would be the researchers' perspective/value of world/reality. It related to how they interpret the reality/data. (Charlotte)</p>

The questionnaire contained a question that asked novice researchers to match three definitions with three frameworks. The three frameworks were theoretical framework, conceptual framework “methodology”, and practical framework. The results showed that twelve out of fourteen answered correctly. Two novice researchers, one from each group, answered incorrectly.

By looking at the result of their self-assessment in Figure 61 and comparing it with their results on the closed-ended questions, it becomes clear that novice researchers in group A, which had no publications, are similar to the results of novice researchers in group B which had publications. This means that there is no qualitative difference in the researchers' understanding of the three research frameworks, theoretical, conceptual, and practical, at the level of experience in research publications. The researcher relies on this equality in both groups' results because the 3Ps AO played a role in improving the researchers' understanding in group A because it was presented to them before the closed-ended questions. On the other hand, this effect may not be a certainty in group B because their self-assessment towards their understanding of the three research frameworks was somewhat similar to the result of the evaluation of group A, and their results in the test were close even though group B was not exposed to the 3Ps AO at that point. The researcher indicates that there are answers to other questions that showed a development between the results of the two groups and associated the reason for that development to the review of the 3Ps AO. The following sections explain these data.

Another question gave two prompts: first, “If the result of a study concludes that there is a relationship between variables, no relationship between variables, a significant effect on A, or no effect on A. Accordingly,” and second, “If the result of a study concludes that John said such and such, while Jennifer says such and such, and Michael thinks such and such. Accordingly,” Participants were then asked to respond to each prompt, on epistemology (selecting either

objectivity or subjectivity), ontology (selecting either one reality or multiple realities), paradigm (selecting either interpretivism or positivism), research data analysis (selecting either deductive or inductive), and study design (selecting either quantitative or qualitative). Data suggested that, for epistemology, all the novice researchers in group A and B answered correctly except for two in group B. As for ontology, all except three novice researchers (from group B) answered correctly. As for the paradigm, all except one novice researcher (from group A) answered correctly. For research data analysis and study design, all novice researchers answered correctly.

As mentioned earlier, the results of the novice researchers' self-assessments of both groups, shown in Figure 61, and their answers to the questions in the first step of the interview, show that they lack knowledge of paradigms, ontology, and epistemology. However, by looking at the result of their answers for the last closed-ended question, it appears that the knowledge of group A has improved compared to the results of their self-assessments and is also better than the results of group B. The researcher attributes the development of group A's knowledge to the group because they reviewed the 3Ps AO before the open-ended and closed-ended questions, unlike group B, which did not review the 3Ps AO until after the open-ended and closed-ended questions. Although the novice researchers in group B had scholarly publications, unlike group A, which did not have a scholarly publication, group A, who reviewed the 3Ps AO performed better in the last closed-ended questions.

#### **A description of novice researchers' impressions of the 3Ps AO that contributed to answering the fourth research question**

- What are the novice researchers' impressions about using the 3Ps advance organizer in their research thinking and practice?

The final step in the interview was about the novice researchers' impression of 3Ps AO as shown in Figure 71. After all the novice researchers reviewed the 3Ps AO, the researcher asked them some questions about their impression. The first question in this final step of the interview was your first impression after reviewing the 3Ps AO.

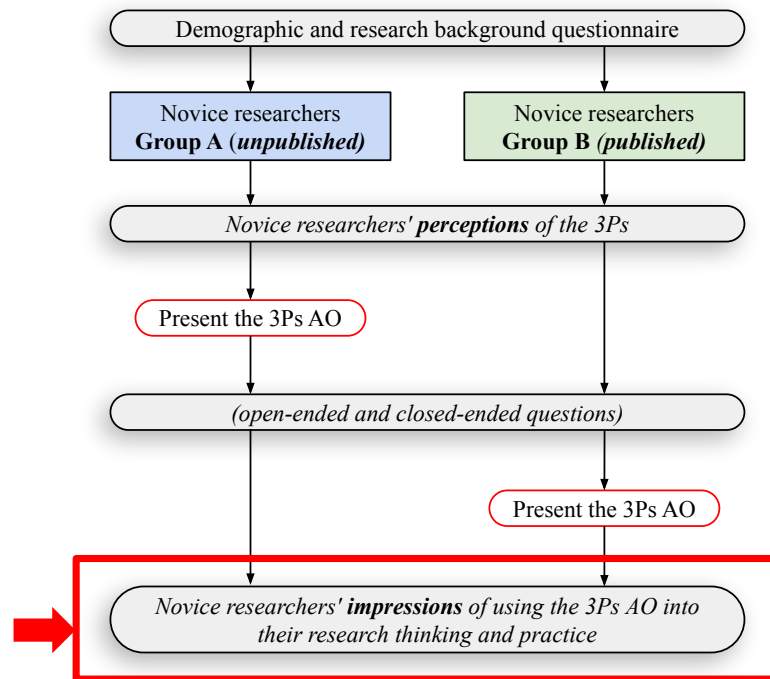


Figure 71. The last step in interviewing novice researchers.

**The first impression of novice researchers when they see the 3Ps AO:** the researcher observed the novice researchers' reaction during their review of the 3Ps AO, especially after about 5 minutes of reviewing the 3Ps AO, the participants seemed to experience an Aha! moment. The Eureka or Aha! Effect referred to the moment of insight when a bewildering problem is suddenly resolved (Friston et al., 2017). This is because its occurrence is an honest reaction to a process that occurred in the respondent's mind. It is considered a psychological reaction of the process of solving a problem that could not be solved and suddenly its solution becomes transparent (Sparks, 2006). This transition from a lack of understanding to a sudden understanding is often

accompanied by delight or satisfaction, an Aha! moment. More recently, the literature on visual design has focused on examining the Eureka effect in recipient reactions (Pressman, 2018).

While the novice researchers reviewed the 3Ps AO on the full screen, the researcher was listening and observing them. The researcher noticed that many novice researchers expressed verbally an Aha! Moment after exploring the AO for five or six minutes. Eight novice researchers shouted, “Wow!” when perusing the AO. Three novice researchers were observed to hit the table, smile largely, or make verbal signs that indicated an Aha! Moment. For example, Elizabeth from group B described this clearly as a moment “where you see that lightbulb come on, and somebody has gotten an idea.” Six exclaimed their Aha! Moment using excited and emotional words such as “Oh my God... that is pretty cool,” “Holy Moly,” “O...h my Gosh.” Four of them mentioned that the 3Ps AO attracted their attention to the point that they forgot that I was observing them, as two expressed their Aha! Moment using [inappropriate words] not negatively but in a positive affirmation such as “Oh F\*\*\*,” and “Damn this is crazy how he made it.”

Three novice researchers expressed that this advance organizer is full of information, however, dividing the organizer into parts helped simplify these complexities. Novice researchers pointed out that they enjoyed the layout in the way it both helped them “drill down” or go deeper, but also to see how concepts connected to one another (Linda, from group B). Charlotte from group B expressed a similar sentiment, remarking on the logical flow of the AO that allows one to go from “the big scope and go deeper, like from the philosophical assumptions.... To the research objects... to specific research methods”. Margaret from group B agreed, saying that “you can see how certain concepts relate to one another... this concept is the larger term that contains these smaller concepts.” They often connected the high level of information that was able to be



understood as a reader to the use of colors, shapes, and graphics. To Daniel from group A, the AO was, "...very engaging. When this came into my view, I thought this was very engaging visually."

The use of color was one of the most common observations made by novice researchers. Ten of them remarked that the AO is colorful and that the colors used, alongside their brightness, express meaning that is recognized through their use in the 3Ps AO. Sophie from group A recognized this, saying, "There's a lot of colors. There are these steps into moving from one topic to another, one idea to another. The explanation is clear, short, and to the point. Different colors are used to describe different words." Margaret from group B read the instructions at the top "to look at colors, so I started doing that" and appreciated the instructions on how to read the graphic. Graphic elements are related to multimedia elements as mentioned in the literature, and the comments from novice researchers in this part confirm the appropriate use of the graphic elements, which reinforces that novice researchers noticed the same graphic value that instructional design experts mentioned in the first phase of the study.

Division of information into sections was appreciated by the novice researchers. Richard from group B described this as "chunking" which contributed to easier understanding. Linda from group B said that this reveals "intersections... between how we see the world, our philosophy, the nature of reality... our philosophy about it, and how we actually apply it."

Isabella and Olivia from group A described the AO as overwhelming and intimidating, both, "at first" and "initially." For Olivia, reading through it and taking advantage of the sectioned nature of the AO made it 'digestible'. Olivia said that having it on one page "scares you" in the beginning but attributed her eventual understanding to it all being on one page.

At least one novice researcher expressed a desire to use the AO as an ongoing reference. Linda from group B said, "I could see myself posting this behind my computer as one of those

documents... that I would refer to... just like Bloom's Taxonomy." One of the group B novice researchers found the AO to be "incredible," saying, "I wish I would have seen something like this before... it would have been helpful for me to identify what I had struggled with throughout my PhD experience." Elizabeth from group B suggested that the AO could be useful for classes where "they assume that people already know" about research methods and where it is "so easy to get confused." Five students desired the AO to assist in their own studies and requested a copy from the researcher. The researcher told the novice researchers that they would share the AO after the defense.

Novice researchers generally have positive impressions of 3Ps AO, and their comments included an affinity with the traits of the advance organizer that Ausubel (1960, 1978) and Searls (1983) defined as a learning tool characterized by abstraction, generality, comprehensiveness, simplify complex concepts, and linking previous knowledge with new knowledge.

Novice researchers were asked **what the AO is portraying**. Jennifer from group A said, "It looks like the research process. It looks like a higher-level summary of what research is." Jennifer agreed, saying that the AO "looks like the research process." Daniel from group A called the AO "the whole structure of research... from the most basic... from the starting point to the end... it's like an analysis of the process of research." Daniel called the AO a "research scaffold," while Susan from group A called it a "guideline." Isabella from group A expressed similar thoughts, that it portrays what the title is, the main elements of research. Continuing, Isabella said, "I think it is extremely helpful. And clear. I can say it's an inspiration for learning. And I'm not even saying that I got my answers right. Just thinking if this wasn't a testing situation, and I had some time to spend with the AO, I think it makes things very clear and concise." Isabella found the AO as useful as a class, saying, "This has given me more clarity than I got in a class. Even

being able to think about what is, what are the key things that you want to try to remember, understand, or explain... I don't know that those things are necessarily highlighted in the research courses themselves. Like you hear a lot of terms, but not necessarily that you need to hold onto them in any tangible way.” Elizabeth from group B saw the AO just like a textbook, comparing the ordering and organization to David Creswell’s books. Susan said that she wished she had received the AO earlier as it would have comforted her during her studies. Susan described a learning environment where people pretended to know what concepts meant instead of asking for help. To her, the AO would have helped address this.

Despite the multiplicity of descriptions made by novice researchers about 3Ps AO, they all give a positive impression confirming that novice researchers have learned from it; in other words, they assert that it is an easy-to-understand learning tool, simplifying the complex field in a short time, appropriately designed, evoking previous knowledge effectively. These perceptions are among the primary goals of this study. Generally, the impressions of novice researchers of 3Ps AO confirm the application of cognitive load theory in minimizing external processing, managing essential processing, and increasing germane processing.

Novice researchers were asked about **which part of the AO they thought was most familiar to them**. Nine of the novice researchers, four from group A and five from group B, mentioned that the first section, especially the praxis, is the most familiar part for them; three novice researchers (two from group A and one from group B) went with the last part, the fifth; and one of the novice researchers from group A went with the second part, and one from group B went with the fourth part. The 3Ps AO parts are shown in Figure 72. The justification of the nine novice researchers who chose Part 1 as the part they are most familiar with was because it matched their ideas to some extent in terms of starting from the research objectives setting up to data analysis

approaches. The people who went with the last part did so because it clarifies the differences between method triangulation and methodological triangulation with examples. One said part four because of the paradigm example; that person expressed his frustration with understanding paradigms, but he had an Aha! moment and finally understood the concept of paradigm through the AO. When looking at the results of the self-assessment of novice researchers in Figure 61 and the result of their answers in this section, commonalities emerge, as many novice researchers stated that they have high knowledge of praxis, and this corresponds to most of their answers that the first part of the 3Ps AO, specifically the praxis part, is the most familiar part for them.

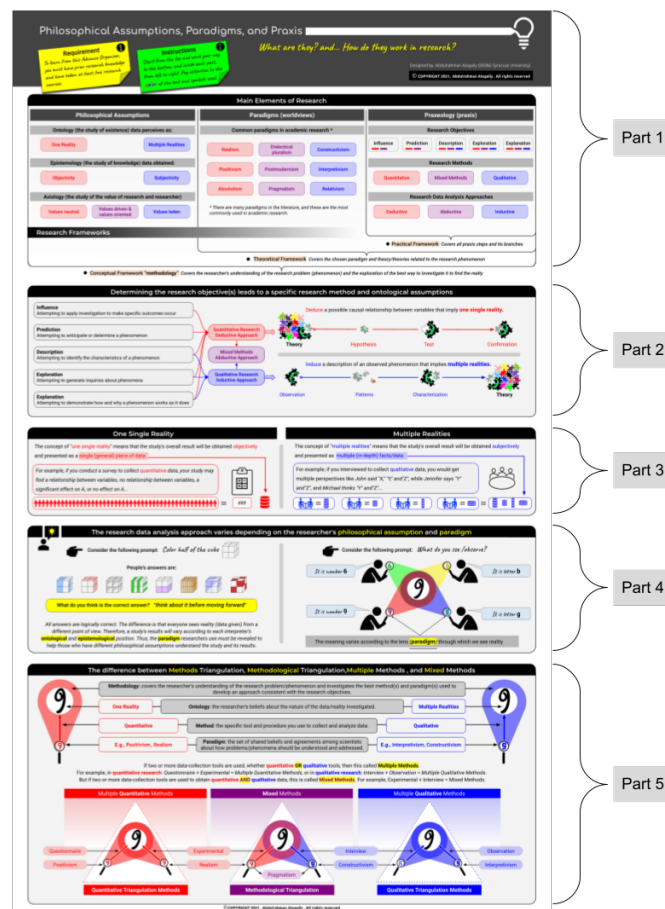


Figure 72. 3Ps AO parts.

There is a question about the ability to learn the 3Ps from this AO. Most novice researchers believed that if AO readers complied with the requirements and instructions listed at

the top—namely, that readers must have prior research knowledge and read the AO from top to bottom, left to right, paying attention to colors and symbols—that readers would be able to understand the AO. In other words, novice researchers only needed to follow the directions on reading the AO and have the recommended prior research experience. As Olivia from group A said, “A little bit of prior knowledge had a lot to do with the retention of the knowledge presented on the AO.” Most novice researchers believed that ten minutes was not sufficient to review the AO. Instead, multiple novice researchers suggested that the AO is best used as a companion, for instance, to be hung on the wall and referenced as needed.

Novice researchers were asked about what can be done to improve learning about the 3Ps from AO. Some said that it should be interactive, with popups and links. Others said it would be helpful to have an audio accompaniment to help explain each part. It wasn’t that each part was unclear, rather, novice researchers were interested in having access to examples of real studies. Some novice researchers suggested that, if interactive elements were introduced, assessments would be useful for moving from one part of the AO onto the next. Novice researchers were also asked to imagine what would be the most important thing to add or change. All responded that they were satisfied with the AO as presented.

**The novice researchers' impressions about the ability to learn the 3Ps** as the main elements of research from the AO confirmed that the principles of multimedia learning were achieved in the 3Ps AO as planned, despite the time during which the participants reviewed the AO did not exceed 10 minutes, it showed positive feedback confirming learning achievement. However, participants discussed some ideas that would support learning the 3Ps more conclusively, such as developing the AO to become dynamic. The 3Ps AO, as mentioned in the introduction to this study, was developed as a static learning tool. However, the researcher

considered the importance of the feedback of the novice researchers in developing the 3Ps AO into a dynamic learning tool. The comments of the novice researchers on developing the AO to be interactive correspond with the suggestions made by the instructional design experts in the first phase of this study. In the future, the researcher looks forward to developing the 3Ps AO to be dynamic as recommended by the participants in the two phases.

Overall, novice researchers enthusiastically found the AO to be a useful and artful tool. Three novice researchers from group B and one from group A, after weeks passed, contacted the researcher to ask follow-up questions regarding parts of the AO or to request a copy. Novice researchers were so enthusiastic that two of them offered to return the monetary incentive to the researcher, because the AO was such a useful tool—of course, the researcher declined this gesture. Some novice researchers, like Charlotte from group B, called perusing the AO a “wonderful learning experience” while Richard from group B wished he could “savor” it longer, a “very positive” experience. Linda from group B described her experience as an “extremely excited one” that made her “want to think about every concept that was presented.” Sophie from group A was glad to say that the AO has prepared her to better explain these concepts to others. Isabella from group A explained that she had been challenged to “firm up the things you think you know but don’t really” and that using the AO will help her avoid “throwing out words without understanding just like everyone else”—“it’s been a good experience, I have enjoyed it, just knowing that something like this exists.” Susan from group A put it simply: “Ten out of ten!”

### **Summary of the data in phase II**

The results presented in this chapter dealt with the perceptions of 14 novice researchers about the Philosophical assumptions, Paradigms, and Praxis, and their impressions of the AO on those 3Ps. The data were collected through semi-structured interviews conducted online; each

interview lasted about an hour and thirty minutes. The researcher asked the novice researchers a set of questions and carried out some activities during and before the interview that resulted in exploring their perceptions of the 3Ps and knowing their impressions about the 3Ps AO. The data obtained from the interviews contributed to answering the third and fourth research questions as planned. The researcher did not encounter any challenges mentioned in the interviews except for the limited response of one of the novice researchers to some of the interview activities. Nevertheless, the researcher believes that this is a normal subject matter for many circumstances, and the researcher has accepted this matter while realizing that it is expected in human studies.

In general, the interviews revealed that novice researchers, whether those with a scientific publication or those at the beginning of the study stage, face a challenge in understanding the 3Ps, and the results showed that students who do not have any scientific publications gave answers in the test presented during the interview that were equivalent to the results of the novice researchers who had research activity. Nevertheless, as the researcher explained in the introduction to this chapter, this study is not experimental and is not subject to a variant test on another, but rather an exploration of individuals' experiences. This led the researcher to link further the results obtained in the study with the literature, which is explained in the next chapter.

## **CHAPTER 6. DISCUSSION**

### **Introduction**

This chapter presents the researcher's interpretation of the study results discussed in the fourth and fifth chapters. This study achieved four main objectives that were covered in two independent phases in terms of methodology. The first phase of the study focused on describing instructional design experts' opinions on the application of multimedia learning principles in the 3Ps AO and describing their opinions about the 3Ps AO in general as a helpful learning tool, and the data was collected through three rounds of Delphi technique. The second phase focused on the study of phenomena, in which 14 individual interviews were conducted with novice researchers to explore their perceptions of the 3Ps and describe their impressions of applying the 3Ps AO in their research thinking and practice. The importance of achieving the research objectives mentioned above lies in filling a gap in the literature represented in novice researchers' lack of understanding of the philosophical assumptions, paradigms, and praxis (3Ps) and their applications in research. The lack of understanding of the 3Ps has undermined confidence in the rigor and trustworthiness of their research. This chapter includes eight sections: the reflexivity on the study data; delimitations and limitations; plans and procedures; major findings of the first phase and discussion; major findings of the second phase and discussion; implications for theory and practice; recommendations for future study; and conclusions.

### **Reflexivity in the study outcomes**

Since the data analysis in this study relied on an inductive approach, reflectivity is a solid accompaniment to surrounding practices around the studied phenomenon (Markham, 2017). Cohen et al. (2018) argue that reflexivity is a vital feature of qualitative research and distinguishes it from other methods. Just as reflectivity is a threat in quantitative research, it is a source of



strength for qualitative research (Cohen et al., 2018; Mortari, 2015). Mann (2016) argues that every qualitative researcher needs to embrace an expression of the nature of the data collection and analysis process and that reflexivity is the key to this endeavor. Reflexivity is a tool to understand better (Finlay, 2002). Reflexivity in the context of research refers to the process of critical thinking rooted in the data we present and our position in providing that data (Braun & Clarke, 2013). Braun and Clarke (2013, p. 29) add that “reflectivity in research is about getting the researcher into the research, which makes us visible as part of the research process - unlike quantitative research, where the researcher is usually invisible (like a robot).”

In light of this, it is worth noting that both reflectivity and reflexivity of the researcher are present in the study steps, starting from the moment in which the type of sample was determined, through the researcher's monitoring of the eligibility of each participant included in the study, up to the interaction between him and the participants. That is, it was an interactive process at all times that allowed the researcher to present detailed evidence stemming from the lens through which the data was identified and perceived, and whose explanation in a detailed manner enhances the rigor and trustworthiness of the study, according to Cassell and Symon (2004), Mann (2016), Huberman and Miles (2002), and Whittemore et al. (2001).

### **Limitations (Validity and trustworthiness of the findings):**

This study contains a set of limitations related to the validity and trustworthiness of the study, which are characteristics associated with the methodology and techniques used in collecting the study data. Some limitations are outside the control of the researcher and thus may have an impact on the results.

The researcher realizes the intensity of the controversy between quantitative and qualitative researchers over decades about the concept of validity and its applications in research methods

(Cypress, 2017). Therefore, the researcher adopts in this study the prevailing statement of Maxwell (1992, p. 284) that "validity is not an inherent property of a particular method, but pertains to the data, accounts, or conclusions reached by using that method in a particular context for a particular purpose." The researcher also realizes that the validity stemming from a quantitative perspective does not apply on the basis of this study. Many scholars such as Braun and Clarke (2013), Finlay (2002), Morse (1991), and Sandelowski (1993) state that it is neither logical nor scientific to enact validation criteria associated with a specific method to another method that has completely different characteristics. Reflectivity, which is invoked in qualitative research, is seen as a practice that the researcher must undertake to make research policies transparent, thus enhancing trustworthiness (Hertz, 1997). Therefore, this study's rigor and trustworthiness stem from several aspects, most notably the researcher's presence, entity and disclosure, the nature of the interaction between the researcher and the participants, the triangulation of data, interpretation of perceptions, and the richness and size of data, as stated by Cypress (2017).

### **Plans and procedures**

The instruments and their operational plan were developed in the study towards a path in which data is fetched logically and rationally to answer the research questions. In other words, the components of the instrument in this study were not arbitrarily determined, whether in relation to the elements that the experts asked in the first phase or the activities and questions that took place during the interviews with novice researchers in the second phase, all of which are considered as scaffolds that contribute to the achievement of the study objectives in general, as many considerations were taken during the planning and development of the instruments in the two phases. Despite that, some changes have occurred in the first phase, for example, represented by the addition of the third round of Delphi in the first phase of the study, but this was taken into

account in advance, meaning that it was expected, so well-prepared steps were taken for that. Specifically, the plan was to hold two rounds of Delphi, but since the expert responses did not reach the level of consensus in the second round, the third round was implemented to ensure the consensus of the experts and the stability of their consensus in the rounds in addition to making sure that the theoretical aspect of the main topic was saturated (Skulmoski et al., 2007).

### **Major findings of the first phase and discussion**

The results of the first phase of this study are detailed in Chapter Four. This section discusses how these results contributed to addressing the research problem that was investigated in order to answer the following two research questions:

- To what extent do instructional design experts agree that the multimedia learning principles were used in the 3Ps advance organizer?
- To what extent do instructional design experts agree that the overall 3Ps advance organizer is a helpful learning tool?

The results of the first phase showed evidence of the consensus of instructional design experts in three rounds of Delphi on the use of multimedia learning principles in the advance organizer of the 3Ps and the consensus of experts that the 3Ps AO is a helpful learning tool.

The instructional design experts' opinions were taken in three successive rounds, each of which took approximately a month, that is, three months for Delphi rounds to be completed, in addition, there were procedures preceding the Delphi rounds, which are described in Table 9 in Chapter Four. The first-round results concluded that the multimedia learning principles were used extensively in the 3Ps AO except for the modality and personalization principles in the first, second, and last parts of the 3Ps AO. The modality principle states that people learn more deeply from narrations and graphics than on-screen text and animation. The personalization principle

focuses that learning happens better when the learning tool contains a conversational style instead of the formal style (Mayer, 2009, 2014). The modality principle among the principles examined received many comments from experts in the first round, with about 75% of the experts identifying it as unused or used to a low extent. These experts explained that the reason underlying their choice is a lack of narration. The researcher provided a definition for each principle in the rubric that the experts used for examining the extent to which the multimedia learning principles were used in the 3Ps AO, but it seems that the term (narration) mentioned in the definition of the modality principle added a bit of ambiguity in the experts' understanding, as some understood in the first round that the narration is "spoken narration." Although the narration may occur in two cases, either spoken or written, depending on the nature of the instrument (Nowina-Krowicki et al., 2019), and since these AO is static media, written narration has been used. In this respect, and as stated in the previous chapters, the principles of multimedia learning used in 3Ps AO are principles related to static media, not dynamic. The researcher believes that the modality principle, among the principles examined in the AO, lies in the gray area between the appropriate principles for static and dynamic media, meaning that this principle can be partially achieved in both static and dynamic media.

In the second round of Delphi, and among the adjustments made by the researcher based on the comments provided by the experts in the first round, the narration mentioned in the definition of the modality principle was clarified, which corresponds to the nature of the AO as a static and not dynamic learning tool. Expert consensus improved in the second round regarding the use of the modality and personalization principles. There was complete consensus on the use of all principles in all parts of the AO except for the modality principle in the first part, which is shown in Figure 39. The researcher believes that this does not affect the consensus of experts on

the use of modality in the AO, because it is widely used in the rest of the AO according to the experts' opinion, i.e., consensus 4 out of 5. The general objective of this phase was to investigate the extent to which the multimedia learning principles were used in the entire AO.

In the third and final round of Delphi, more than 75% of instructional design experts came to consensus that different types of multimedia principles have been applied to design an advance organizer about the 3Ps, as shown in Table 31; of which: coherence, signaling, spatial contiguity, modality, segmenting, multimedia, and personalization were used extensively. This is in addition to the principle of pre-training, which the instructional design experts reviewed as printed on top of the 3Ps AO and approved it.

Table 31. The multimedia learning principles used in the 3Ps AO.

Purpose	Multimedia Principles	Brief description of the principles (R. E. Mayer, 2009)	Consensus of its use at 75% by ID experts	IQR*
Reduce extraneous processing	Coherence	People learn more deeply when exotic words, pictures or sounds are excluded rather than included	Moderate extent	1
	Signaling	People learn more deeply when adding signs that highlight key ideas and word organization.	Moderate extent	1
	Spatial Contiguity	People learn more deeply when corresponding words and images are presented close together on a page or screen	Moderate extent	1
Manage essential processing	Segmenting	People learn more deeply when large segments are broken down into smaller, manageable chunks	High extent	0
	Pre-training	People learn more deeply when they have prior knowledge of the content as well as the characteristics of the basic concepts	Prerequisite prior to using the AO	--
	Modality	People learn more deeply from narrations and graphics than on-screen text and animation	Moderate extent	1
Increase germane processing	Multimedia	People learn more deeply when the learning tool comprises of words and pictures instead of just words	Moderate extent	1
	Personalization	People learn more deeply when the learning tool contains words in conversational style instead of the formal style	Moderate extent	1

\* The interquartile range (IQR): 2 or less = strong group consensus, 3 or more indicates dispersed responses.

This section provides the researcher's interpretation of the results of the first research question in this study supported by theoretical rationale about the multimedia principles that instructional design experts have unanimously used in the 3Ps AO, along with the results of the

second research question, which describes the opinions of instructional design experts that the 3Ps AO is a helpful learning tool, as follows:

**The coherence principle** indicates that extraneous words and graphics were excluded from the AO, which may lead to better learning of the 3Ps. The theoretical rationale for the coherence principle is that novice researchers are more able to focus on the core subjects of the 3Ps content if extraneous content are excluded that could distract them. The extraneous elements compete for cognitive resources in working memory and can distract the learner from important points, disrupt the process of organizing the material, and prepare the learner to incorporate items with inappropriate content (R. E. Mayer et al., 2014b). In the literature, there is solid and consistent support for the effect of coherence. A literature review by Mayer (2017) showed positive results for excluding extraneous elements in 22 out of 23 experiments, with an average effect size of  $d = 0.86$ ; see (Adesope & Nesbit, 2012; R. E. Mayer et al., 2001; R. E. Mayer & Anderson, 1992; R. E. Mayer & Jackson, 2005; Moreno & Mayer, 2000a; B. Park et al., 2011; Sanchez & Wiley, 2006; Sung & Mayer, 2012).

**The signaling principle** indicates that relevant information of the 3Ps in the AO was highlighted by using headings, bolding, italics, underlining, larger font, capital letters, color, arrows, white space, and related techniques to attract the learner's attention to specific parts of the AO, which leads to better learning of the 3Ps. The theoretical rationale for the signaling principle is that novice researchers will learn more efficiently because the 3Ps content is designed to attract their attention to the key elements of the AO and its organization. The signaling principle was supported in a literature review by Mayer (2017), which found that 25 out of 29 experimental tests showed positive results from using signaling, and subsequently yielded a median effect size of  $d = 0.41$ ; see (Amadiou et al., 2011; Boucheix et al., 2013; Boucheix & Lowe, 2010; de Koning et

al., 2010; Doolittle & Altstaedter, 2009; Jamet et al., 2008; Jarodzka et al., 2013; Koning et al., 2007; Kriz & Hegarty, 2007; Mautone & Mayer, 2001, 2007; R. E. Mayer & Fiore, 2014, 2014, 2014; Moreno, 2007; Naumann et al., 2007; Ozcelik et al., 2010). An experimental study by Richter et al. (2016) concluded a positive small-to-medium effect size ( $r = .17$ , 95% confidence interval [0.11, 0.22]) supporting signaled multimedia material was found to, in particular, support learners with low prior knowledge; which means that this conforms to the conditions set for novice researchers to use the 3PS AO in this study.

**The spatial contiguity principle** used in the 3Ps indicates that related words, text, and graphics were presented close to each other. The theoretical rationale is that spatial contiguity helps novice researchers build connections between corresponding information and graphics. As previously mentioned in Chapter Three, the 3Ps components were classified as complex by many novice researchers; and as a result, the researcher believes that the high use of the principle of spatial contiguity in the 3Ps AO, which the experts validated, will contribute to the dismantling of complex content and help novice researchers link information more effectively. Ginns (2006) carried out an experimental study, where analyses indicated that, for complex learning materials, increasing the spatial contiguity of relevant information elements leads to significant learning gains. On a large scale this principle was supported in the literature. Mayer (2017) reviewed that 22 out the 22 experimental tests showed positive results from spatial contiguity, yielding a median effect size of  $d = 1.10$ ; see (Austin, 2009; Bodemer et al., 2004; Cierniak et al., 2009; C. I. Johnson & Mayer, 2012; Kester et al., 2005; Moreno & Mayer, 1999; Pociask & Morrison, 2008).

**The segmenting principle** used in the AO indicates that the large segments demonstrating the components of the 3Ps have been divided into parts and sections, and manageable chunks. The theoretical rationale for the segmenting principle is that AO segmentation allows novice



researchers to fully process the first part before having to move onto the next part and as such until the novice researcher's understanding of the five parts of the AO is complete. According to Clark and Mayer (2016b), in relation to the cognitive load theory, the rationale for using the segmenting principle in multimedia tools is that it allows the learner to engage in essential processing without overloading the learners' cognitive load. The results of an experimental study conducted by Mayer and Chandler (2001) shows evidence that segmenting learning material into parts helps people learn better, as the post-test results of the two groups revealed that learners who received the segmented presentation performed better than learners who received a non-segmented presentation, despite the fact that the provision of the materials are identical in both groups. The results of this study are also consistent with similar studies, such as that of (R. E. Mayer et al., 2003; Moreno, 2007). This principle among the multimedia principles examined in this study has been used widely in the AO based on the opinion of instructional design experts, as shown in Table 31. The division of parts depends on the hierarchical structure of the information presented, starting from a general idea to a specific one. This means that the novice researcher takes an overview of the components of the 3Ps in the first part and then descends to specific details shown in each part, and within those parts, the graphic elements played an important role in organizing the learning process, which was explained on the following page. In a review of the literature on the impact of segmenting, Mayer (2017) found that 10 out of 10 experimental tests supported the use of signaling, with a median effect size of  $d = 0.79$ ; see (Boucheix & Schneider, 2009; Hasler et al., 2007; Hassanabadi et al., 2011; Lusk et al., 2009; R. Mayer & Chandler, 2001; R. E. Mayer et al., 2003; Moreno, 2007; Stiller et al., 2009).

**The pre-training principle** intended to be used in the AO was that novice researchers had prior knowledge of the research, representing a basic knowledge for the content presented while

not implying a thorough knowledge of the 3Ps. The theoretical rationale is that pre-training allows novice researchers to focus on the causal connections in the 3Ps AO explanations because they already know the names and characteristics of the key components. It should be noted that, as indicated, the pre-training principle underwent a different Likert examination from the rest of the principles used in the rubric, as it was examined through two options: used or not used. This is because the nature of the advance organizer requires prior knowledge, so prior knowledge of research was considered a prerequisite for the use of the 3Ps AO, and this requirement was placed at the beginning of the 3Ps AO. Instructional design experts agreed that this method and formulation are suitable to meet this principle. In a review of the literature on the impact of pre-training, Mayer (2017) stated that 18 of the 20 experimental tests he found in the literature supported the use of pre-training; learners scored higher on post-test tests when they received pre-training, resulting in a mean effect size of  $d = 0.75$ , which is in the high range; see (Eitel et al., 2013; Kester, Kirschner, et al., 2006; Kester, Kirschner, & Merriënboer, 2004; Kester, Kirschner, & van Merriënboer, 2004; Kester, Lehnen, et al., 2006; R. E. Mayer, Mathias, et al., 2002; R. E. Mayer, Mautone, et al., 2002).

**The modality principle** used in the AO indicates that a written narration was added explaining the complex and relevant parts. The theoretical rationale is that the principle of modality allows novice researchers to manage the cognitive load by providing narrative information relevant to components of the AO and thus contributing to supporting more manageable essential processing. The researcher believes that any theory is capable of development and possibly change over time. As was referred in Chapter Three, this study is primarily based on the cognitive theory of multimedia learning and is compatible with the theory of cognitive load in multimedia learning. The cognitive theory of multimedia learning has been prevalent in the literature. However, some

needs have emerged with time to develop applications of multimedia principles, in particular the modality principle (Broek et al., 2014). The researcher believes that the lack of understanding that occurred from the instructional design experts in the first round of Delphi results from the current literature focusing on spoken narration instead of written narration, which, at first, resulted in the connection of the concept of narration with spoken narration in the experts' minds. Broek et al. (2014) confirm this claim, and an experimental study showed no performance difference between the written narration and the verbal narration groups immediately after learning. However, after one day, the written narration group had significantly higher scores on three out of four outcome measures and these results of this study are consistent with that of (Kim et al., 2017; Tabbers & van der Spoel, 2011). In short, results from previous studies contradict the well-known modality principle defined by Mayer, and instead, the authors suggested that multimedia learning tools should include written narration, whose benefits may be partly due to the successful use of reading strategies. The aforementioned confirms that applying the principle of modality in the AO justifies that it meets the cognitive need required to support the learning process of novice researchers of the 3Ps.

**The multimedia principle** used in the AO indicates the use of pictures, shapes, and text instead of just words. The theoretical rationale for using the multimedia principle in the AO is that novice researchers learn the three elements better when they engage in related cognitive stress, such as the presence of relevant content of the 3Ps, mentally organizing the content into a coherent cognitive representation, and mentally integrating the content with their existing knowledge. The researcher would like to clarify that there is a difference between the principles of multimedia as a whole and the principle of multimedia intended here. Mayer (2014b) stated that it can be argued that the multimedia principle is a starting point for all other principles, since it indicates that

learners perform better when exposed to words and pictures rather than just words. Since multimedia presentations may or may not be listed, it is essential to emphasize that the “words” in this case must be either printed or spoken, but not both (in line with other multimedia principles). Effective exploitation of images and words together fosters generative processing. Mayer stated in another issue that multimedia principle refers to:

“presenting words and pictures that are intended to foster learning. The words can be in spoken form (such as narration) or in printed form (such as onscreen text). The pictures can be in static form (such as illustrations, diagrams, maps or photos) or dynamic form (such as animation or video).”

**The personalization principle** indicates that the AO’s text took the character of conversation instead of the formal style. The theoretical rationale for this technique is that the conversational style of the AO can generate a sense of social presence in the novice researchers, making them try more earnestly to understand what the AO is telling by engaging in appropriate cognitive processing during learning, which results in learning outcomes that are better able to support knowledge transfer and problem-solving. The effect of using the personalization principle in multimedia was supported in 14 out of 17 experimental comparisons reviewed by Mayer (2017), where students learned better from multimedia lessons that contain a conversation style rather than a formal style, resulting in an average effect size of  $d = 0.79$ , which is a large effect; see (Kartal, 2010; R. E. Mayer et al., 2004; McLaren et al., 2011a, 2011b; Moreno & Mayer, 2000b, 2004; Wang et al., 2008). This pattern of results supports the personalization principle used in the AO, which means that novice researchers can learn the 3Ps better from the AO. In general, the personalization principle was implemented by using first and second-person constructions in the texts of the AO.

**The use of graphic elements and principles in the 3Ps AO**, see Table 18 in chapter 4, showed that there was a consensus of 75% at a high level by instructional design experts on the use of graphic elements and principles in the 3Ps AO such as contrast, repetition, alignment, proximity, color, typography, hierarchy, balance, space, and direction. These elements have a firm influence on the principles of multimedia learning and in particular, the principles of signaling, spatial contiguity, segmenting, and multimedia, as preliminary research (Karolick, 2001; Kimball, 2013; Koning et al., 2007; Pralle, 2007) shows that using graphic elements and principles in multimedia tools improves learning. The researcher believes that a person cannot create an effective learning video or learning poster, for example, with a weak set of skills in graphic design elements and principles. Such products will lose a sense of artistic creativity, which naturally affects the recipient's acceptance of that product. We may see works that are full of valuable content but are presented poorly and vice versa. Therefore, the researcher tried to apply the graphic design elements and principles in the AO appropriately. Consequently, the researcher presented a set of questions to the experts asking about the extent of using ten theoretically sound and generally accepted graphic design elements and principles in the AO.

In general, the results of the first phase of this study showed evidence of the consensus of instructional design experts that the principles of multimedia learning have been widely used, namely: coherence principle, signaling principle, and spatial contiguity principle were used to reduce extraneous cognitive load; segmenting principle, pre-training principle, and modality principles were used to manage intrinsic cognitive load; multimedia principle and personalization principle were used to increase the germane load. Also, Instructional Design experts have expressed the opinion that the 3Ps AO, in general, is a helpful learning tool for novice researchers. Dozens of the previously mentioned experimental studies have proven the effectiveness of using

these principles for learners. From this standpoint, the researcher believes that the 3Ps AO has fulfilled the basic pillars on which it can be said that it is a learning tool ready to be presented to novice researchers. The next section shows the researcher's interpretation of the novice researchers' perceptions of the 3Ps and their impressions on the use of the 3Ps AO, which answered the third and fourth questions in this study.

### **Major findings of the second phase and discussion**

The results of the second phase of this study are detailed in Chapter Five. This section discusses how these results contributed to addressing the research problem that was investigated to answer the following two research questions:

- What are the novice researchers' perceptions of philosophical assumptions, paradigms, and praxis in research?
- What are the novice researchers' impressions about using the 3Ps advance organizer into their research thinking and practice?

The second phase results revealed novice researchers' perceptions of philosophical assumptions, paradigms, and praxis in research, and their impressions about using the 3Ps advance organizer in their research thinking and practice. The perceptions and impressions of the novice researchers were taken in semi-structured one-on-one online interviews with 14 participants. The average interview took 90 minutes, which equates to approximately 1,260 minutes for the total of the interviews. All the novice researchers were selected in a homogeneous convenience manner, as indicated in the methodology chapter. They were divided into two groups in the interview, a group with lower prior knowledge in research, and a group with higher knowledge. The division of the two groups was based on the number of research publications from each participants.

The result revealed that novice researchers with either lower prior knowledge in the research (no publications) or the group with higher knowledge (had publications) face a challenge in understanding the philosophical assumptions, paradigms, and praxis in research. This is consistent with recent literature from researchers like Kivunja & Kuyini (2017) and Makombe (2017). However, among the three elements of the research, praxis was understood most by researchers in both groups; this is in line with Johnson's and Onwuegbuzie's (2004b) studies. The research novices often suffer from weaker preparation in philosophical foundations and scientific paradigms (Alogailly & Koszalka, 2020; Kivunja & Kuyini, 2017; Makombe, 2017; Stanley, 2006).

### **Perceptions of novice researchers towards the 3Ps**

In order to get acquainted with the novice researchers' perceptions, a set of questions and activities were asked during the first part of the interview scaffolded each participant's perceptions of their level of understanding the 3Ps of research. The interviews were conducted online with the results of these research knowledge questions shared in detailed in the previous chapter. The following sections provide an interpretation of the novice researchers' results for each part of the interview in support of the first research question: What are the novice researchers' perceptions of philosophical assumptions, paradigms, and praxis in research?

**The starting point for conducting research:** novice researchers expressed the starting point for conducting research on various topics such as finding a topic, a gap in the literature, or identifying an interest. The similar perceptions described the novice researchers in both groups confirmed that despite their different research experiences, their answers did not correspond with what the expert researchers support as the starting point of research in the literature. Research experts, such as Johnson and Christensen (2019), Leavy (2017b), Muijs (2010), Neuman (2011), and Ruane (2015), confirm that the actual beginning of the research should be setting the research

objectives (influence, prediction, description, exploration, or explanation), which was represented in the 3Ps AO.

The researcher believes that defining the research objectives is the first critical point for starting a research project. We often come across studies that say that the first point a researcher should start with is defining the topic, defining the question, defining the hypothesis, defining the problem, etc. The researcher believes this is contrary to the logic of conducting research. Johnson and Christensen (2019) and Leavy (2017b) argued that a person cannot identify a topic or question without knowing what to look for, or without acknowledging why the person is searching in the first place (i.e. their objectives). The researcher also touched on some of the similarities in the perceptions of the novices interviewed in this study about the starting point of the research with other doctoral students whom he meets in many places. Also, the researcher noticed a similarity in the perceptions of the novice researchers who were interviewed in this study about the actual starting point of the research project with what the doctoral students whom he met on different occasions discussed, and the researcher relies upon reasons behind this, that most textbooks reference stating that the first step a researcher should take is to define the topic.

**Novice researchers' perceptions of the meaning of a philosophical assumption:** the novice researchers have expressed meaning of philosophical assumptions on various topics such as finding a topic, a gap in the literature, or identifying an interest. Whereas philosophical assumption as defined in the research literature is a theoretical framework covering the researcher's understanding of the research problem (phenomenon) and explores the best way to investigate it to find the reality, and in philosophy in general, there are many assumptions, but in research, the focus is on three types which are the ontological, epistemological, and axiological assumptions (Crotty, 1998; Rust et al., 1999). Philosophical assumptions and paradigms are often confused by



novice researchers, and their speculations about what it means to have a philosophical assumption in research lack confidence. The common themes of their responses were that they did not know what the philosophical proposition meant, that the philosophical proposition was their method of theorizing, and that it was related to their own beliefs about the topic, and that the philosophical propositions provided knowledge. The researcher noted that novice researchers used the terms assumptions and philosophical paradigms interchangeably during their discussion of their perceptions. Also, as indicated previously, the researcher noticed that the term philosophical assumptions and paradigms were used interchangeably in the literature, although there is a major difference between them. Therefore, the researcher expected this confusion during the interviews with the novice researchers, because in self-assessments, both groups tended to classify their knowledge as low in philosophical assumptions, ontology, and axiology (see Figure 62).

Weaver and Olson (2006), citing Markey et al. (2014), states that research experts strongly recommend that before starting a research project, novice researchers should understand the various philosophical assumptions that support the purpose of the study and explore their personal philosophical beliefs.

**Novice researchers' perceptions of what it means to have a philosophical worldview:** novice researchers' perceptions in both groups often discussed the worldview interchangeably with the philosophical assumptions and referred to culture and ethics as part of the worldview, while some did not know and guessed the meaning. The answers of the novice researchers showed confusion, as the novice researchers in both groups saw the philosophical assumptions as paradigms, and 7 of them (3 from group A and 4 from group B) stated that they hated these terms and expressed their anxiety in talking about them. One from each group expressed that their biggest concern was to include philosophy in their research, and they mentioned that this was one of the

reasons that made them miss writing dates for their dissertation. The researcher believes that the misunderstanding and lack of knowledge indicate that these terms are not used carefully in the literature, and are used interchangeably, as mentioned previously, in a way that novice researchers cannot understand and distinguish. Shannon-Baker (2016) recalled that although we advocate for researchers to discuss their paradigms in their published work, the literature lacks sufficient guidance to clarify research paradigms, especially for novice researchers, on precisely how these perspectives can be applied.

**Novice researchers' perceptions of the meaning of theoretical framework:** when the novice researchers were asked about theoretical frameworks, the researcher noticed little exclamation and discomfort during their answers and some embarrassment [not that they are uncomfortable in the interview], but many of them disclosed that although they have published scholarly papers, they still felt a little confused in their understanding of these terms. The novice researchers described the theoretical framework as a lens, a conceptual framework, and foundations for thought while expressing some doubts about the topic. Some had mixed theoretical frameworks with theory. Confusion continued for novice researchers in both groups on this question as well, as their answers mainly indicated the definition of a theoretical framework as a philosophical one. The ongoing confusion supports the finding that novice researchers have a great deal of difficulty in understanding these terms. Indeed, their confusion about these terms is one of the main reasons for their fear of explaining and using them in research. Passey (2020) asserted that researchers generally have confusion in using the theoretical or conceptual framework in its correct position, and this petition falls heavily on doctoral students, and the reasons are attributed to the lack of solid methodological evidence that leads learners to a better understanding.

**Novice researchers' perceptions of research methods, types, and examples:** many researchers breathed a sigh of relief when asked about research methods, the difference between them, and examples of them. Their answers appear in Table 25, Table 26, and Table 27, and. About 5 participants (three from group A and two from group B) introduced quantitative and qualitative research as types of research. One participant in group B mentioned that there are five types of research and nevertheless classified data collection tools as types of research. The mixed methods research was not familiar to many of the novice researchers in the two groups. In fact, one of the participants in group A mentioned that mixed methods are a complex thing that he could not understand until that time, which explains why their answers appeared in the self-evaluation shown in Figure 4, where seven of the participants in both groups identified mixed methods as low knowledge and two no knowledge. In general, the research novices, both in group A and B, seemed more comfortable about research methods except the mixed methods research (praxis, in general.) In their self-assessments, both groups rated themselves as having a high level of competency on praxis components (see Figure 62). This makes sense, since most of the research literature focuses on praxis over philosophical assumptions and paradigms (Alogaily & Koszalka, 2020; Kivunja & Kuyini, 2017; Makombe, 2017; Stanley, 2006).

Novice researchers in both groups distinguish simply the qualitative as words, the quantitative as numbers, and the mixed methods as a mixture of words and numbers. This is correct to some extent, but the nuances that researchers can use numbers in qualitative research and descriptions in quantitative research were missing in the responses of novice researchers. For example, statistical methods are used here in this research, but the nature of this particular research is inductive, which is conducted through qualitative research. It seems that research novices have

been trained as Hallett (2014) described "methodological idolatry" rather than a precise understanding of these research methods.

**Results of the novice researchers' test on the components of the 3Ps:** As was detailed in the previous chapters, the test was presented to group A after the 3Ps AO was presented to them, unlike group B, who were not shown the 3Ps AO until after they completed the test. In general, the results of the two groups converged in most of the questions, except for the last question, which showed more performance in favor of group A, who were classified as having low experience in research and who were shown the 3Ps AO before the test. The researcher relies on interpreting this result in two aspects: first, is that the 3Ps AO played a helpful role in developing the knowledge of the lower experience novice researchers in group A, which made their answers similar to those of Group B who have higher experience in research, or that the 3Ps AO did not play a significant role in this, because in the last question in the self-assessments, the novice researcher in group A was higher than in group B. Despite that, the researcher tends to go with the first aspect, especially after looking at the group A's answers in the first section of the interview, which showed a contradiction with what they mentioned in their self-assessments apparent in Figure 62. The researcher reasserts that this is not an experimental study to measure the effect, rather, it is an exploration and review of their perceptions, which means that their result in this test cannot be taken for granted for generalization, in return, the result can be transferred to other contexts or settings by doing a thorough job describing the study context and the central assumptions to the research.

In addition to this, the novice researchers' drawings about their perceptions of the concept of triangulation in methods and methodology presented another evidence revealing the achievement of learning from the 3Ps AO, as the perceptions of the novice researchers in group A

reflected the definition of the triangulation as mentioned in the literature, which was included in the 3Ps AO, in contrast to what was presented by group B, which took different dimensions. Nevertheless, it can be said that the drawings of group A were distinguished by some similarities and relationships with what is in the 3Ps AO, unlike group B, which expressed its perceptions of the concept of triangulation in method and methodology creatively and differently from group A. And since group A's illustrations are similar to what is on the 3Ps AO, meaning that they almost transferred the knowledge they received to their drawings, this shows the achievement of their remembering of that information, which, according to Bloom's theory, is considered an achievement of the level of remembering. Also, this fact confirms the achievement of the cognitive objectives linked to each part of the 3Ps AO and developed according to the learning objectives and classified each objective's behavioral structure according to Bloom's taxonomy.

Overall, the perceptions of novice researchers, whether those with lower research experience or those with higher experience, revealed challenges in understanding the 3Ps, especially philosophical assumptions and paradigms, which novice researchers often reveal as posing a dilemma; however, these perceptions were taken in the first section of the interview, that is, before the 3Ps AO was presented to them.

### **Impressions of novice researchers on the use of the 3Ps AO into their research thinking and practice**

Impressions of the novice researchers about the use of the 3Ps advance organizer into their research thinking and practice were obtained through their answers to a set of questions and activities that were asked to them in the last part of the interview. The previous chapter explained their impressions in detail, and the following sections review the interpretation of those data that

responded to the last research question: What are the novice researchers' impressions about using the 3Ps advance organizer into their research thinking and practice?

**The first impression of novice researchers when they saw the 3Ps AO:** the reactions of novice researchers varied in the first moments when they saw the 3Ps AO. Some of them declared their admiration, and most of them experienced the eureka effect (also known as the Aha! moment or eureka moment), especially in the first five minutes. Although some of their reactions were somewhat "unexpected" from the researcher's point of view regarding their loss of control over some of their words, it meant much admiration mixed with shock. The loss of control by novice researchers after seeing the 3Ps AO has implications and meaning in psychology. During the past decades, many researchers in psychology and education have attempted to develop models for insightful problem-solving; among these endeavors is a four-stage model developed by Wallas (1926). At one stage of the model as described by Spector et al. (2013), while a person's feeling that the problem is unsolvable arises, another phase follows where the active search for a solution is interrupted, and the problem solver puts the problem aside. This stage is called the incubation stage. Suddenly, the problem solver gains insight into the problem. This stage is called the illumination stage and is characterized by the fact that the solution to the problem appears unexpectedly in understanding to the person who is solving the problem. Subsequently, the verification stage includes identifying the implications of the new vision. What distinguishes this model being discussed here is the incubation stage followed by the spontaneous illumination, which is called the Eureka or Aha! moment (Sadler-Smith, 2015; Spector et al., 2013).

The Eureka or Aha! Effect refers to the moment of insight when a bewildering problem is suddenly resolved (Friston et al., 2017). Reigeluth and Carr-Chellman (2009, p. 187), stated that the "learning process can often occur in a one-shot sort of manner—the sudden 'eureka'

phenomenon of, in an instant, reorganizing one's ideas and acquiring a precious insight." This is because its occurrence is an honest reaction to a process that occurred in the respondent's mind. It is considered a psychological reaction to solving a problem that could not be solved, and suddenly its solution becomes transparent (Sparks, 2006). Delight or satisfaction, an Aha! often accompanies this transition from a lack of understanding to a sudden moment of understanding. This is what actually happened with most novice researchers when they first saw the 3Ps AO, as their reactions from the researcher's point of view and based on the concept of eureka express a sincere feeling of learning, or more precisely, a feeling of capturing information that was absent from them and then at some point filling the cognitive gaps they have. Gardner (1978, p. 8), stated that:

"There certainly is a close connection between aha! insights and creativity in science, in the arts, business, politics, or any other human endeavor. The great revolutions in science are almost always the result of unexpected intuitive leaps... In many cases, the solution is not found by exhaustive trial and error. In many cases, the solution is a Eureka insight."

It was also previously revealed that the results of the second phase of this study showed clear evidence of the existence of knowledge gaps for the novice researchers about the 3Ps, and that the researcher noticed the emergence of Eureka traces in the actions of the novice researchers when reviewing the 3Ps AO in the first moments; however, this study focused on providing a description of the novice researchers' impressions about the 3Ps AO, although the researcher feels great enthusiasm to dive more, to take a closer look at the meaning of these impressions and systematically test its impact on learning, this may be one of the future studies extended from this work. Given the significance of the occurrence of the Eureka effect, recent literature on visual

design has focused on studying its effect on recipient reactions (Pressman, 2018); cognition (Robertson, 2016); creativity in the context of educational practice (Beghetto & Corazza, 2019); and deep data presentation and design (Munzner, 2014; Murray, 2013).

**The researchers' impression of what the 3Ps AO represents:** By looking at the multiple names and descriptions that novice researchers have expressed about the 3Ps AO, we see topics like guiding the research process, complete research structure, research scaffolding, guidelines, key elements of the research, textbook, and set of lessons. However, it can be said that they all revolve around one area that can be framed as a “learning tool.” Novice researchers' descriptions of the 3Ps AO also included comparisons and parallels, such as someone saying the 3Ps AO gave her more clarity than what she learned in class. At the same time, someone else likened the 3Ps AO to one of David Creswell's famous research books, and another person said this AO is an inspiration for learning the 3Ps. Many of them also wished that the 3Ps AO had been with them while studying or taking their comprehensive exam to overcome the difficulties they encountered. Also, these descriptions and names correspond to some of the characteristics of the advance organizer identified by (Ausubel, 1960, 1978; Searls, 1983). In general, descriptions of novice researchers carried positive patterns that the reader could easily deduce. Nevertheless, the researcher took an additional second dimension to interpret the impressions of the novice researchers, which is that these qualities presented by novice researchers provide evidence that they were struggling to understand the 3Ps and that they had just found their way after suffering. It is also worth noting that the novice researchers' experience in the research did not make a difference in their impression of the 3Ps AO, meaning that the higher research experience group provided a similar description to those who have less experience in research, and this gives an indication that the 3Ps AO is suitable for researchers in general. This fact in reality is consistent



with what the experts said in the first phase of the study, that this 3Ps AO may be suitable for learning and teaching alike, and for novices and advanced researchers as well.

**The most familiar part of the 3Ps AO for novice researchers:** Nine novice researchers, four from group A and five from group B, mentioned that the first section, especially the praxis, is the most familiar part for them; three novice researchers (two from group A and one from group B) went with the last part, the fifth; and one of the novice researchers from group A went with the second part, and one from group B went with the fourth part. The identification of the majority of novice researchers in the first section is a confirmation of the literature that stated that researchers' knowledge is focused on the praxis part more than on the philosophical assumptions and paradigms (Kivunja & Kuyini, 2017; Makombe, 2017; Stanley, 2006). This is also consistent with the results of their self-assessment, as most of them mentioned high knowledge in the parts of the praxis, see Figure 62. At the same time, the result of the selection of the majority of novice researchers showed significant indications, which is that the starting point from which the 3Ps AO users start is a point they are familiar with, which means that the 3Ps AO began with the part that is most familiar to novice researchers as confirmed by most of the participants in this study. This, of course, also confirms the achievement of the hierarchical cognitive construction used in developing the 3Ps AO.

**Suggestions of novice researchers to develop the 3Ps AO:** The novice researchers' suggestions resembled what the experts mentioned in the first phase in this study about the 3Ps AO being dynamic, allowing them to interact with the contents such as listening to an audio explanation, watching a video, and accessing links for more information. These suggestions are valuable, but they are appropriate for dynamic learning tools; that is, they oppose the concept of the nature of the advance organizer that was developed in this study and which is a static learning

tool. There is a sharp eruption in the literature about the effects of static versus dynamic multimedia; the researcher, for his part, does not see that there is a fixed rule that can be asserted that static media is better than dynamic, because everything is due to different factors, for example, the nature of the subject, beneficiaries, context, time, cost, and many other factors with the researcher realizing that the project to develop the 3Ps AO to become dynamic is an inevitable matter that will be achieved. Nevertheless, concerning the suggestions of novice researchers related to its nature as a static tool, one of them mentioned that it would be better if it had been developed to be like a foldable sheet so that it would be easy to carry it in the bag and use it from time to time. Another mentioned that it would be good if the 3Ps AO was printed large enough to be a sticker on the wall. The latter mentioned this note because this 3Ps AO may be received in electronic form. However, there is a point that many overlooked, which is that this 3Ps AO was designed by Adobe Illustrator software using vector graphics, which means that it can be enlarged and minimized without affecting the resolution of the graphic elements, as well as if it is printed on a very large page, it is not going to be affected. This method also facilitates many steps in the future when developing it to be dynamic. The researcher also did not notice a fundamental difference in the suggestions of the novice researchers between the two groups, as their suggestions were to some extent similar, which means that the experiences of the novice researchers in the research did not affect the breadth of their impressions of what the 3Ps AO will look like in the future.

#### **The novice researchers' impressions about the ability to learn the 3Ps from the AO:**

The novice researchers confirmed in terms close to their own that their learning of 3Ps from AO was indeed achieved, although the time was very short. They all described that experience as positive and astonishing. Most of them expressed that the reason behind the positive result for

learning the 3Ps, despite its complexity, is the optimal use of multimedia principles, especially the principle of signaling. The impressions of novice researchers about the importance of the signaling principle coincide with an experimental study conducted by Alpizar et al. (2020) which showed that the effect of the signaling principle in multimedia learning tools changes according to the level of prior knowledge of the learners. Specifically, learners with low prior knowledge benefited the most when using the signaling principle, while no difference in learning was observed between learners with high prior knowledge. Since all of the participants in this study are novice researchers, this confirms the use of the signaling principle in a distinctive and suitable way for novice researchers.

In general, the results of the second phase of this study are interpreted in two main points: The first is those novice researchers, whether with higher research experience or with lower experience, face challenges in understanding philosophical assumptions, paradigms, and praxis in the research, and they use terminology related to the 3Ps interchangeably and in a disorganized manner, sometimes in an incorrect context. Some of them attribute the causes of the lack of knowledge to the learning resources where the information presented in some references is difficult to understand. The second point is that the novice researchers expressed positive impressions about using the 3Ps advance organizer into their research thinking and practice. Their positive impressions emerged in their reactions during the moment of reviewing the 3Ps AO for them and in their responses to the interview questions. In addition, the performance of the group of novice researchers with lower research experience, who were shown the 3Ps AO before the test, showed better performance in some of the test questions compared to the other group of novice researchers with higher experience in research.

## Delimitations

The delimitations of the study lie in the characteristics that limit the scope of the study and describe the boundaries within which the study was conducted. This includes the topic, participant, and methodology delimitations.

**General fact about data:** Although this study was conducted in two phases, and each phase differs from the other in terms of objectives, data collection tools, and participants, the study results are generally transferable (Ratner, 2002; Sobel, 2009). Transferability refers to the degree to which qualitative research results can be transferred to other contexts or settings. Trochim et al. (2015) reported that transferability could be achieved by a thorough description of the research context and underlying assumptions; by providing that information, the study results may be transferred from the original study situation to a similar situation; and which were achieved in this study.

**Contents and subjects:** The data examined in this study related to all the contents of the 3Ps AO are results of various research, references, and studies, and they have been verified through the methodology of triangulating evidence and subjected to face validity on a limited number of researchers. However, the researcher recognizes that this data may not coincide with what is stated in research literature in general, and therefore its delimitations lie in the references that were relied upon and referred to in this study.

**Participant:** Participants in the first phase differed from the second phase, although the number in both phases was consistent with what was recommended by the literature. However, the two samples were chosen in both phases purposefully under certain criteria and in a certain technique, that is, the participants had specific traits that were taken into account to identify them. This also makes the opportunity to transfer the result of this study to other contexts or settings

possible by doing comprehensive work describing the context of the study and the central assumptions of the study.

**Methodology:** Each phase in this study included different tools for collecting data as indicated previously, although the researcher acknowledges the hard effort that had taken place in order to obtain the evidence, those long and multiple steps that were taken may include some failures due to the great effort either on the researcher or on the participants. This means that it is very likely that those long steps are one of the reasons for the lack of response of the experts on the Delphi rounds. The amount of data, data obtained from novice researchers in the interview in the second phase of this study, included the same issue. One of the challenges that I encountered during the interpretation process was separating myself as an interpreter when I listened to interviews and (me) as the interviewer. This is because what I heard during the analysis is more detailed and deeper than what I heard at the actual interview. During the analysis, I can repeat the interview dozens of times and conclude many points. But during the actual interview, being in front of someone who might say something quickly, perhaps I did not catch or understand or vice versa, this undoubtedly may affect the flow of some ideas. While listening to the interviews, I went through many moments in which I pulled my hair out of oppression, where I wished to go back and ask the participant to clarify a specific point or give an example and such. However, in general, I firmly believe that recording interviews contributed to a considerable extent in effectively conveying the participants' voice while reducing ambiguity, in contrast to the interviews that lacked recording and in which the voice of the analyst was more. On the other hand, one of the strengths of this study was the researcher's experience and skill in graphic design. As explained in the introduction to the third chapter of this dissertation, the researcher's skills in graphics and his academic background contributed to effectively achieving many steps.

### **Recommendations for future study**

This study achieved the research objectives as planned. In the first phase and through three Delphi rounds, the opinions of instructional design experts on the use of multimedia learning principles in the 3Ps AO are described, and also the expert's view of the usefulness of the 3Ps AO as a learning tool was described. The study showed evidence of using multimedia learning principles in the 3Ps AO. It is a helpful learning tool because it reduces the extraneous cognitive load, manages the essential cognitive load, and increases the germane cognitive load. The results of the second phase revealed that novice researchers faced challenges in understanding the 3Ps. They have described the 3Ps components interchangeably and in disorganized ways, sometimes incorrectly. After reviewing the 3Ps learning tool, novice researchers have shown positive impressions and results during the final conversations about the 3Ps AO. In short, instructional design experts and novice researchers alike have expressed that the 3Ps AO is helpful in learning. In the midst of the study procedures and results, the researcher extrapolated a set of recommended vital points, which are:

- Expanding the use of the 3Ps AO as an instructional tool in addition to being a learning tool, as the 3Ps AO was studied in this study as a tool from which the individual learns. However, experts in the first phase and novice researchers in the second phase of this study praised that the 3Ps AO would also be helpful if used as an instructional tool, i.e., to assist with instructors/trainers who teach research curriculum. Also, having curriculum and design specialists discuss how to integrate

this AO in courses or programs to enhance the learning of 3Ps across a curriculum or series of 'research courses.'

- The results of this study represent a solid basis for the theoretical and practical side as they can be transferred to other contexts or settings or rather replicate the second phase of this study with additional novice researchers in specific fields such as social sciences or natural sciences; or to conduct a comparative study between novice researchers in both The humanities and natural sciences fields, also taking their previous experience level as a variable in conducting empirical studies to measure the effect of 3Ps AO on researchers' performance to get more generalization in the chosen field. For example, comparing one group of researchers who have publications in a different field to another group; or two groups, one of which is published and the other unpublished; Or doing a more specific study and choosing a sample more specifically, such as people who have research with specific research methods versus groups that have a different method, such as quantitative researchers versus qualitative researchers.
- Developing the 3Ps AO to become dynamic by adding multimedia learning principles compatible with dynamic tools such as redundancy, temporal contiguity, voice, and image on the 3Ps AO, then re-validate their application by instructional design and accessibility experts in order to meet standards and regulations accessibility that ensures content and design is clear and simple enough that most people can use it without having to adapt it while supporting those who need to adapt things. Also, this is in line with what has been recommended by many

instructional design experts and novice researchers alike in developing the 3Ps AO to become dynamic.

- Considering the participants' recommendations is an essential and vital matter as well, as many novice researchers have mentioned that they wish to put this 3Ps AO in classes so that it is easy to refer to it and remember information during the discussion. Therefore, the researcher realizes that providing the 3Ps AO in front of the learners in a common area where they usually sit will contribute to the generation of knowledge and essential questions that lead to deep learning; also, this can raise a discussion that may contribute to generating new ideas and questions for developing the 3Ps AO in future studies.
- In previous recommendations in which I indicated to expand the study by conducting experimental studies to determine the effect of 3Ps AO on the performance of researchers, this can be achieved by studying one part of 3PS AO instead of all parts.
- The research methodological structure in this study can be applied in any other learning content while taking into account changing the characteristics of the participants.

## **Conclusions**

This study was characterized by a rather complex conceptual framework that included two separate research phases in terms of study objectives, approaches, and participants. The first phase concerned validation and was conducted in three rounds of Delphi technique with experts in instructional design. The second, a phenomenological study, was conducted through semi-structured interviews with novice researchers. The first phase of this research, the validation study,



fulfilled the objectives of describing the opinions of instructional design experts on applying the multimedia learning principles in the 3Ps AO and describing their overall opinion of the AO as a helpful learning tool. This phase produced evidence from instructional design experts that the principles of multimedia learning (i.e., coherence, signaling, spatial contiguity, segmenting, pre-training, modality, multimedia, personalization) were applied to a strong degree in the 3Ps AO. This reduced extraneous cognitive load, management of intrinsic cognitive load, and increasing the germane load processing. The second phase of this research, the phenomenological study, conducted by semi-structured interviews of 14 novice researchers, fulfilled the objectives of exploring novice researchers' perceptions of the 3Ps in research and described their impressions of the 3Ps AO into their research thinking and practice. The impressions of both groups, novice researchers with lesser research experience and those with higher experience of using the 3Ps AO, were queried about their research thinking and practice. The results showed positive impressions from all participants. In short, instructional design experts and novice researchers alike have expressed that 3Ps AO is a helpful learning tool.

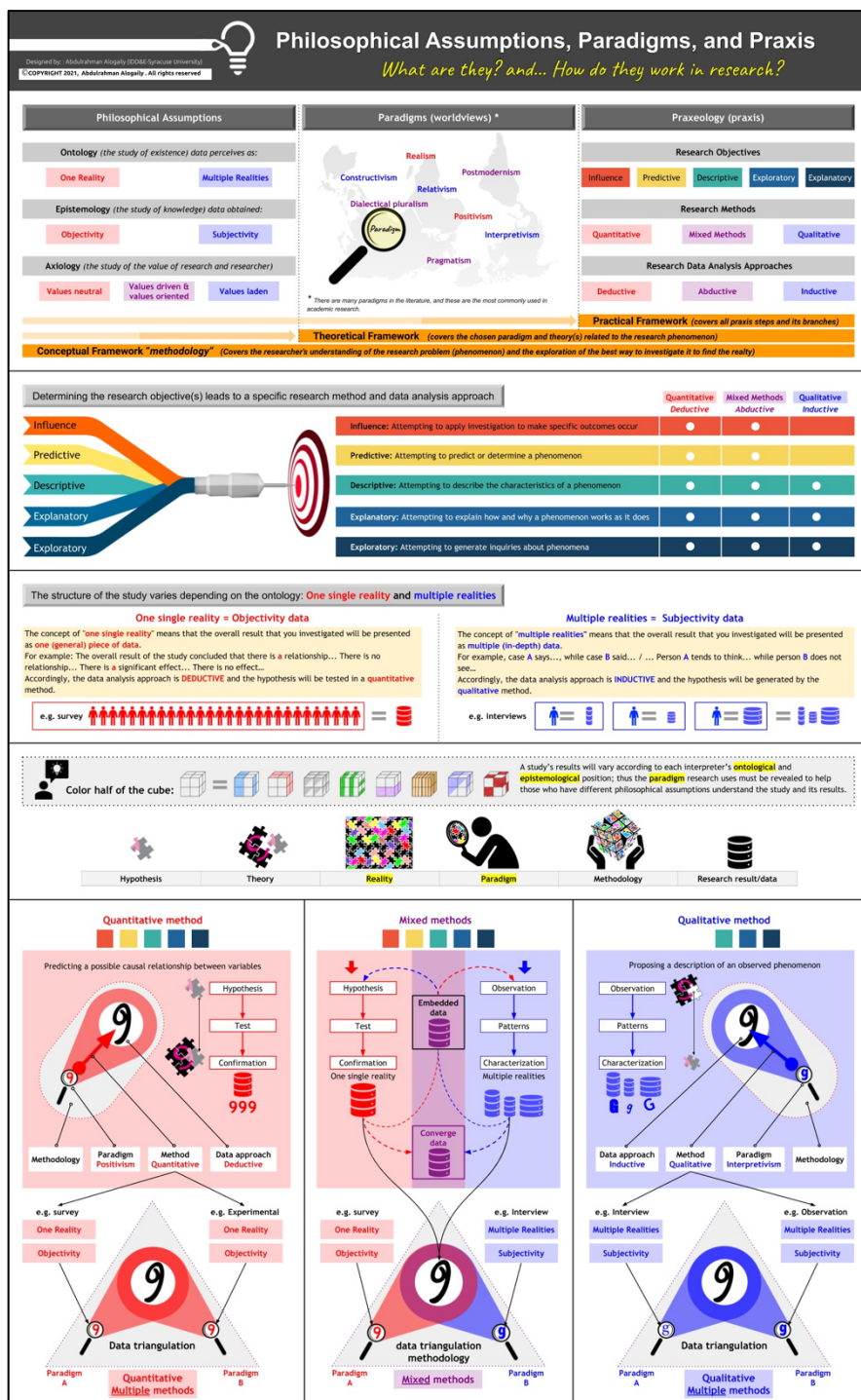
In general, this study has achieved the research goals, and the data revealed that the map contributed to enhancing the novice researchers' understanding of philosophical assumptions, paradigms, and praxis and their relationships with each other in the research, which will lead to enhancing the rigor and trustworthiness of their research.

This study makes many contributions to literature in the field of instructional design, development and evaluation, the most prominent of which is the use of the conceptual framework that was developed in this study, and which played an influential role in achieving the objectives of the study, as researchers in this field or other fields can use this research framework for investigation any other learning content. The study results also conclude the positive role the

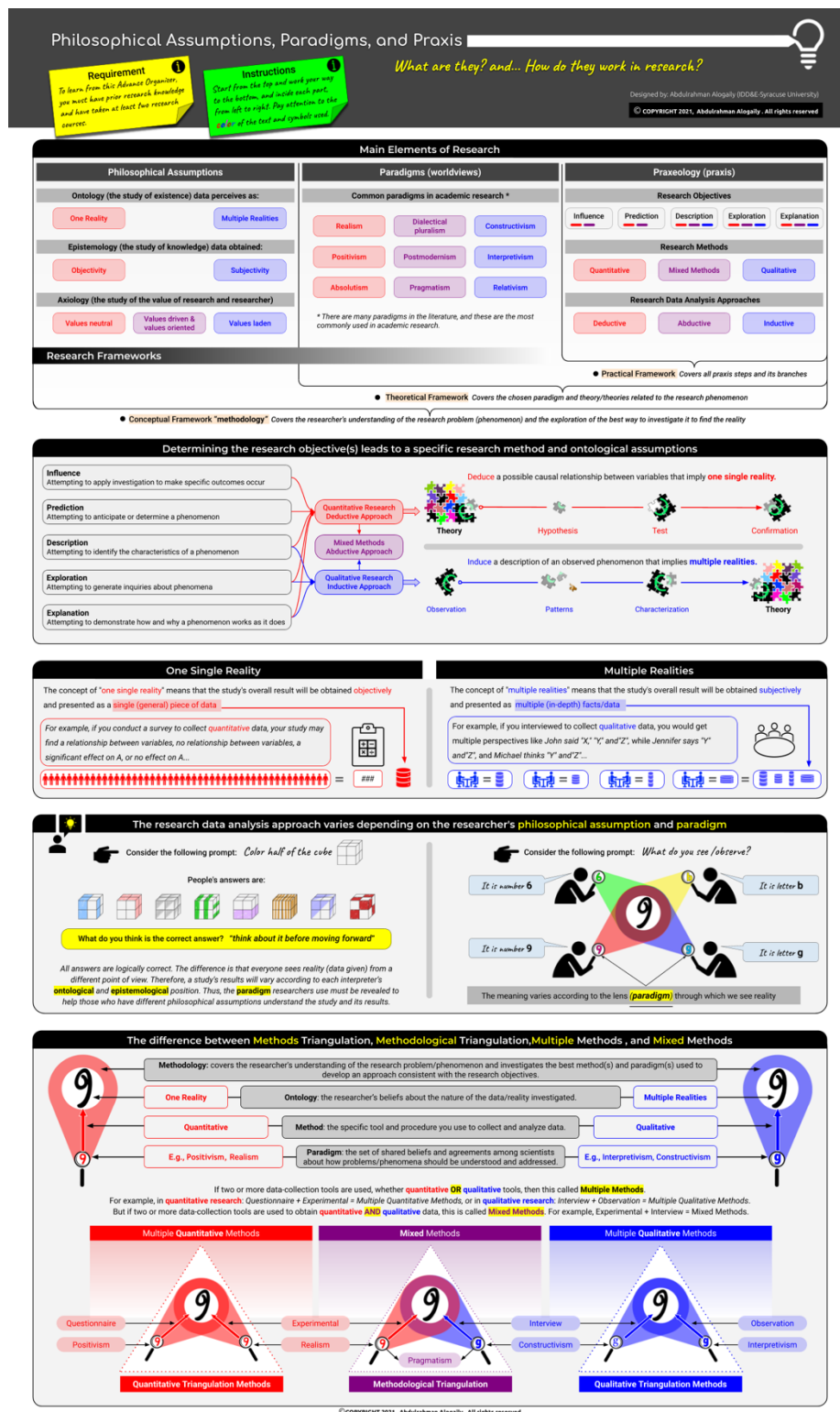
multimedia learning principles used in the 3Ps AO play in providing information in a better way to novice learners with limited or high experience. Finally, the results conclude the influential positive role that the advance organizer plays as one of the learning tools provided that the principles of multimedia are applied in it. The three axes mentioned above relate to the field of instructional design, development and evaluation in terms of theory and practice. Therefore, the researcher realizes the vital role that this study will play in the literature.

## **APPENDICES**

## Advance Organizer (initial design)



## Appendix 1 3Ps Advance Organizer (Validated)



*Appendix 2 IRB Approval Letter for Phase I - Delphi Study*

**SYRACUSE UNIVERSITY**



**INSTITUTIONAL REVIEW BOARD  
MEMORANDUM**

**TO:** Tiffany Koszalka  
**DATE:** November 3, 2020  
**SUBJECT:** **IRB Review Not Required**  
**IRB#:** 20-314  
**TITLE:** *The Use of Multimedia Learning Principles in a Learning Tool About the Main Elements of Research: A Consensus of Instructional Design Experts*

It has been determined by the Office of Research Integrity and Protections that the information submitted pertaining to the above referenced protocol does not meet the definition of human subjects research ("a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge involving any intervention or interaction with a living individual about whom an investigator conducting research obtains data through an intervention or interaction, or identifiable private information.") and does not require IRB oversight for the following reason:

**This research is not about the individuals, experts are being asked about the tool, to validate the design of the learning tool.**

Should there be any change in the nature of the activity originally proposed (e.g. testing results used for research purposes), a new protocol application specific to these changes must be submitted. Thank you for your cooperation in our shared efforts to assure that the rights and welfare of people participating in research are protected.

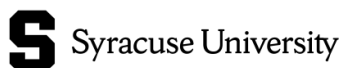
Sincerely,

Tracy Cromp,  
 Director  
 Office of Research Integrity and Protections

DEPT: Instructional Design, Development & Evaluation (IDD&E), 259 Huntington Hall

STUDENT: Abdulrahman Alogaily

*Appendix 3 IRB Approval Letter for Phase II - Novice researchers Interview*



INSTITUTIONAL REVIEW BOARD  
MEMORANDUM

**TO:** Tiffany Koszalka  
**DATE:** January 14, 2021  
**SUBJECT:** Determination of Exemption from Regulations  
**IRB #:** 20-354  
**TITLE:** *Novice Researchers' Perceptions and Impressions of an Advance Organizer on Main Elements of Research: Philosophical Assumptions, Paradigms, and Praxis*

The above referenced application, submitted for consideration as exempt from federal regulations as defined in 45 C.F.R. 46, has been evaluated by the Institutional Review Board (IRB) for the following:

1. determination that it falls within one or more of the eight exempt categories allowed by the organization;
2. determination that the research meets the organization's ethical standards.

It has been determined by the IRB this protocol qualifies for exemption and has been assigned to categories **2 & 3**. This authorization will remain active for a period of five years from **January 13, 2021** until **January 12, 2026**.

**CHANGES TO PROTOCOL:** Proposed changes to this protocol during the period for which IRB authorization has already been given, cannot be initiated without additional IRB review. If there is a change in your research, you should notify the IRB immediately to determine whether your research protocol continues to qualify for exemption or if submission of an expedited or full board IRB protocol is required. Information about the University's human participants protection program can be found at: <http://researchintegrity.syr.edu/human-research/>. Protocol changes are requested on an amendment application available on the IRB web site; please reference your IRB number and attach any documents that are being amended.

**STUDY COMPLETION:** Study completion is when all research activities are complete or when a study is closed to enrollment and only data analysis remains on data that have been de-identified. A Study Closure Form should be completed and submitted to the IRB for review ([Study Closure Form](#)).

Thank you for your cooperation in our shared efforts to assure that the rights and welfare of people participating in research are protected.

Tracy Cromp, M.S.W.  
Director

DEPT: Instructional Design, Development and Evaluation (IDD&E), 259 Huntington Hall

STUDENT: Abdulrahman Alogailly

Office of Research Integrity and Protections  
214 Lyman Hall, 100 College Place  
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## Appendix 4 Instructional Design Experts Invitation Letter

Dear .....

You have been identified as an expert in the field of Instructional Design with specific expertise in multimedia learning design. As such, you are invited to participate in a groundbreaking study that will begin with validating the application of multimedia learning principles used to create a visual learning tool (advance organizer) designed to help novice researchers better understand key research elements. This online study is being conducted by Abdulrahman Alogaili, a PhD candidate in the Instructional Design, Development and Evaluation Program at Syracuse University's School of Education. The research is being supervised by Dr. Tiffany A. Koszalka, professor of Instructional Design, Development and Evaluation.

Specifically, I am asking you to participate in my dissertation study entitled: *Validation and Perceptions of an Advance Organizer on Main Elements of Research: Philosophical Assumptions, Paradigms, and Praxis*. Your role, as an expert in instructional design and multimedia learning principles, will be to review and provide comment on the multimedia design of the given advance organizer that visualizes three foundational aspects of research – philosophical assumptions, paradigms, and praxis or the 3Ps. The 3Ps have been identified and summarized in the advance organizer based on an exhaustive review of the literature in research methods and education.

Your participation will be within the frame of exploring and assessing the extent to which multimedia learning principles were evident in the advance organizer – How well does the design of this Advance Organizer use appropriate multimedia principles? A rubric and series of short open-ended questions will be provided to prompt you to share your perceptions of the visual design of each part of this learning tool. Your participation will be focused on the design of the tool, not the content of the tool. However, you may share comments on both form and substance in open-ended questions.

You are invited to participate in this study because you have been involved in scholarly activity related to instructional design and multimedia learning principles. Your contribution will help to validate the visual design of this learning tool, which I am hoping will ultimately contribute to bridging an existing and significant gap in the research literature that points to challenges faced by novice researchers. The literature has shown that novice researchers' lack of understanding the main elements of research (3Ps) which undermines confidence in the rigor and trustworthiness of their scholarly works and therefore their ability to explain and defend their work in larger contexts.

The fundamental framework being used to help validate the design of this learning tool is based on the cognitive theory of multimedia learning and cognitive load theory, thus relies on your expertise in the visual design validation process.

### Procedures:

This study will be conducted using a Delphi study method that will take place in two to three rounds.

In the first round you will be asked to rate parts of the advance organizer using an online multimedia learning principles rubric with interspersed sub-questions about graphic design. The rubric contains open-ended



questions to gather any additional thoughts you may have about other multimedia learning principles or modifying the advance organizer.

In rounds two and three you will be asked to provide opinions on a version of the advance organizer modified after the previous round, based on feedback from the previous round. Thus, after each round, the tool will be modified based on expert feedback and sent back to the Delphi group to review and ultimately arrive at a collective consensus on the visual design.

Note that the third round will be conducted in the event that the data does not reach the saturation point by end of round two, meaning that the discussion continues until new ideas have stopped emerging from the participants.

**Time Commitment:**

Your participation in the Delphi study will first involve reviewing and agreeing to provide digital consent to participate. This process is expected to take less than five minutes. Once you provide consent it is estimated that it will take approximately 15-20 minutes for each of the following two to three rounds. Overall participation in the Delphi Study is estimated to take approximately one hour over the entire data collection period, 1 ½ months.

DELPHI ROUNDS	Availability		REPORT
	FROM	TO	
Round 1	11/05/2020	11/25/2020	12/05/2020
Round 2	12/05/2020	12/25/2020	01/05/2021
Round 3 if needed	01/05/2021	01/25/2021	----

**Potential Risks or Discomforts:**

The risks associated with participating in this study are minimal. If you feel uncomfortable participating in this Delphi study, you may discontinue study participation at any time without repercussions by clicking on the link below asking you to be removed from the mailing list.

All collected data will be stored in a password-protected computer file that is only available to the researcher. You will be identified by a study ID number. Your study ID number will be associated with your email address which will be kept in a digital log that will be locked and stored in a password-protected computer file available only to researchers and dissertation sponsor. Your email will only be used to send reminders to participants about time frames between each Delphi round.

It is also important to note that whenever one works with email or the internet; there is always the risk of compromising privacy, confidentiality, and/or anonymity. Your confidentiality will be maintained to the degree permitted by the technology being used. It is important for you to understand that no guarantees can be made regarding the interception of data sent via the internet by third parties.

**Payment for Participation:**

You will not receive any payment for participating in this research study.

**Participants' Rights:**

Your participation in this research study is entirely voluntary. If you decide not to participate, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. You can decide to withdraw your consent and stop participating in the research at any time without any penalty.

**Potential Benefits:**

There are no direct benefits for the participants. However, participants of this study may gain new knowledge from the content presented in the advance organizer. Although the advance organizer is designed to support novice researchers it may also benefit and eventually provide a tool for teachers of research to aid in researcher education. Please note access and use of the advance organizer and its content, graphics, or elements are confined to this study; it may not be reproduced or shared for other uses. However, after study defense and approval, and upon your request, a high-quality e-copy of the finalize and validated learning tool will be sent to the participants who have completed all rounds of this study.

If you are willing to consent and participate in this research, please complete the following short survey regarding your demographic and research background. This survey will not take more than 5 minutes. Following this survey, you will be provided with a link to the Delphi site.

[https://syracuseuniversity.qualtrics.com/jfe/form/SV\\_6mKdvpVP19Zg3kx](https://syracuseuniversity.qualtrics.com/jfe/form/SV_6mKdvpVP19Zg3kx)

I very much appreciate your assistance in this important study. If you have any questions, comments or concerns about the research, please contact me at (850) 980-1236 or at [aralogai@syr.edu](mailto:aralogai@syr.edu).

Thank you so much!

Sincerely,

Abdulrahman Alogaily | Ph.D. Candidate  
Instructional Design, Development and Evaluation  
259 Huntington Hall  
Syracuse, New York 13244  
e [aralogai@syr.edu](mailto:aralogai@syr.edu)  
SYRACUSE UNIVERSITY | SCHOOL OF EDUCATION  
<http://soe.syr.edu> / <http://idde.syr.edu>

### *Appendix 5 Follow Up Invitation Letter for Instructional Design Experts*

#### **Follow Up Invitation Letter for Instructional Design Experts**

Dear Dr. \_\_\_\_\_

I recently contacted you to request your participation, as an expert in instructional design and multimedia learning principles, on a Delphi study to validate the design of an advance organizer on research elements (3Ps). At this time, I have not received any response from you. (See below for the original email).

I hope you will agree to participate in this Delphi study. I invited distinguished experts in the field of instructional design and multimedia in particular, like you, so I wanted to follow up with you today and ask if you have any questions or concerns. Noting that the stages of this study have been carefully designed to not take much of your time.

However, in the event that you do not wish to participate in this study for any reason, I ask for your assistance in sending the invitation link below to an instructional design professional who you believe has knowledge of multimedia learning principles and may be able to help.

Here is the invitation link:

[https://syracuseuniversity.qualtrics.com/jfe/form/SV\\_6mKdvpVP19Zg3kx](https://syracuseuniversity.qualtrics.com/jfe/form/SV_6mKdvpVP19Zg3kx)

I very much look forward to your contribution and request that you complete the questionnaire by November 20 if you are interested in joining.

Thank you so much!

Sincerely,  
**Abdulrahman Alogaily** | Ph.D. Candidate  
 Instructional Design, Development and Evaluation  
 259 Huntington Hall  
 Syracuse, New York 13244  
[e araloga@gmail.com](mailto:araloga@gmail.com)  
**SYRACUSE UNIVERSITY | SCHOOL OF EDUCATION**  
<http://soe.syr.edu> / <http://idde.syr.edu>

## Appendix 6 Consent Letter for the Instructional Design Experts

### CONSENT LETTER FOR EXPERT PANEL

#### **The use of multimedia learning principles in a learning tool about the main elements of research: A consensus of instructional design experts**

Dear Delphi expert panel member,

Thank you for agreeing to participate in the Delphi study to investigate the application of multimedia learning principles in the design of an advance organizer to support novices in developing knowledge of main research elements.

The Delphi study will be in two rounds - and a third round will be conducted if the need arises. Data will be collected in all rounds via an online rubric with accompanying open-ended questions where a group of experts in instructional design and multimedia principles share their thoughts.

The questionnaire responses will be analyzed after each round in order to ascertain the direction in which the visual design of the advance organizer may need to be modified. The aim is to build a consensus on features that should be included in the advance organizer to support learners (novice researchers) in learning the main elements of research.

Please read the following statements and then tick the box below and type your email address in the specified location to indicate your consent to participate in this study.

- I confirm that I have read and understood the participant information sheet for the above study and have had the opportunity to ask questions.
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences.
- I understand that all the information I provide will be treated in confidence.
- I understand that I also have the right to change my mind about participating in the study for a short period after the study has concluded (Deadline 1st December 2020).
- I understand that my name will not be linked with the research materials, and I will not be identifiable during the Delphi survey or in the reports that result from the research.
- I give permission for my anonymized responses to be used during the Delphi process.

I look forward to your assistance in this important effort. I think you will find the process interesting, and the final results of this study will be made available to you at the conclusion of the study.

If you have any questions or concerns, please do not hesitate to contact Abdulrahman Alogailly by email (aralogai@syr.edu) or phone (\*\*\*-\*\*\*-\*\*\*\*)

☐

Sincerely,  
Abdulrahman Alogailly | Ph.D. Candidate  
Instructional Design, Development and Evaluation  
SYRACUSE UNIVERSITY | SCHOOL OF EDUCATION

*Appendix 7 Demographic and Research Background Survey for Instructional Design Experts***Syracuse University****Delphi Study Demographic and Research Background**

Dear Delphi Study Panel Member,

As an introductory procedure to the Delphi study and to help me learn more about your demographic and research background, I would like you to answer the following short questionnaire: (It shouldn't take more than 5 minutes)

Please submit it before the date

Please provide the information below:

*(Please know that your name and email will not be shared with anyone and will not be used in the study reports. This information is only required in order to contact you for the following rounds, as shown in the consent letter)*

First name

Last name

Email

What is your gender?

☐ Male

☐ Female

☐  Other (specify)

What is your age?

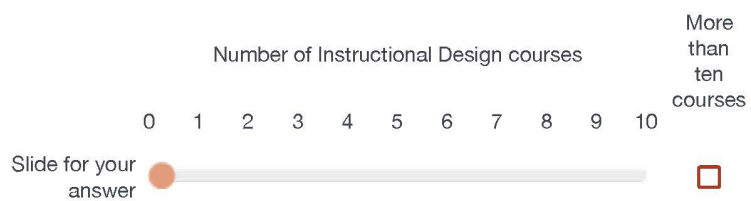
- ☐ less than 40
- ☐ 40 to 49
- ☐ 50 to 59
- ☐ 60 to 69
- ☐ 70 or above

Which of the following best describes your current status?

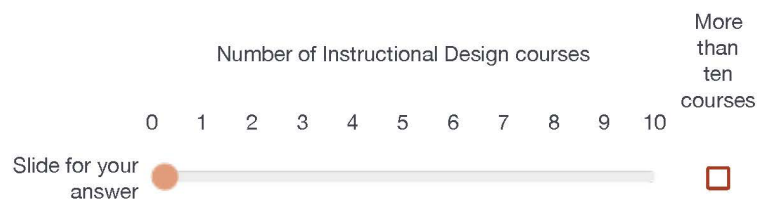
- ☐ Faculty member
- ☐ Employed full-time (Instructional Designer/Learning Designer)
- ☐ Employed part-time (Instructional Designer/Learning Designer)
- ☐ Retired
- ☐ Not employed
- ☐  Other (specify)

How many unique Instructional Design courses have you taught in your career?

*[Please do not count teaching the same course every year, rather how many different Instructional Design courses have you taught]*



How many unique multimedia design courses have you taught in your career?



Which of the following titles, if any, apply to you? *(Choose the single most appropriate answer.)*

- ☐ Professor Emeritus
- ☐ (Full) Professor
- ☐ Associate Professor
- ☐ Assistant Professor
- ☐ Visiting Professor (any rank)
- ☐ Senior Lecturer
- ☐ Lecturer
- ☐ Postdoctoral Fellow
- ☐ None of the above
- ☐ Not sure
- ☐  Other academic title, please enter:

What is the highest degree or level of school you have completed? (If you are currently enrolled in school, please specify the degree you are currently studying.)

- ☐ Doctor of Philosophy (PhD)
- ☐ Doctor of Education (EdD)
- ☐ Doctor of Business Administration (DBA)
- ☐ Doctor of Nursing Practice (DNP)
- ☐  Other (specify)

In which of the following areas did you work? *(Please select all that apply)*

- ☐ Applied Studies
  - ☐ Architecture and Planning
  - ☐ Art
  - ☐ Business Administration
  - ☐ Community Services
  - ☐ Computer and Information Sciences
  - ☐ Dentistry
  - ☐ Engineering
  - ☐ Food and Agricultural Sciences
  - ☐ Government
  - ☐ Higher education (e.g., college, university)
  - ☐ Languages and Translation
  - ☐ Law and Political Sciences
  - ☐ Manufacturing
  - ☐ Military
  - ☐ Nursing
  - ☐ Pharmaceuticals
  - ☐ Primary and secondary education (K-12)
  - ☐ Science and Medical Studies
  - ☐ Sport Sciences and Physical Activity
  - ☐ Tourism and Archeology
  - ☐ Transportation
  - ☐  Other (specify)
-



How long have you been practicing Instructional Design?

- ☐ less than 5 years
  - ☐ 6 - 10 years
  - ☐ 11 - 15 years
  - ☐ more than 15 years
- 

How many research papers have you published in scholarly refereed journals so far (including papers accepted for publication)?

- ☐ less than 10 papers
  - ☐ 10 - 20 papers
  - ☐ 21 - 30 papers
  - ☐ more than 30 papers
- 

Which of the following best describes your knowledge of instructional design?

- ☐ Extensive knowledge
  - ☐ Moderate knowledge
  - ☐ Limited knowledge
- 

Which of the following best describes your level of expertise in multimedia learning principles?

- ☐ Extensive expertise
  - ☐ Moderate expertise
  - ☐ Limited expertise
- 

Which of the following best describes your skill level in graphic design?

- ☐ Professional
- ☐ Intermediate
- ☐ Beginner
- ☐ Not apply

## *Appendix 8 Delphi instrument for validating the 3Ps AO*

### **The use of multimedia learning principles in a learning tool about the main elements of research: A consensus of instructional design experts**

Dear Delphi Study Panel Member,

Thank you for agreeing to participate in the Delphi study to investigate the application of multimedia learning principles in the design of an advance organizer to support novices in developing knowledge of main research elements.

The Delphi study will be in two rounds - and a third round will be conducted if the need arises. Data will be collected in all rounds via an online rubric with accompanying open-ended questions where a group of experts in instructional design and multimedia principles share their thoughts.

The questionnaire responses will be analyzed after each round in order to ascertain the direction in which the visual design of the advance organizer may need to be modified.

The aim is to build a consensus on features that should be included in the advance organizer to support learners (novice researchers) in learning the main elements of research.

Please read the following statements and then tick the box below and type your email address in the specified location to indicate your consent to participate in this study.

- I confirm that I have read and understood the participant information sheet for the above study and have had the opportunity to ask questions.
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences.
- I understand that all the information I provide will be treated in confidence.
- I understand that I also have the right to change my mind about participating in the study for a short period after the study has concluded (Deadline 1st December 2020).
- I understand that my name will not be linked with the research materials, and I will not be identifiable during the Delphi survey or in the reports that result from the research.
- I give permission for my anonymised responses to be used during the Delphi process.

I look forward to your assistance in this important effort. I think you will find the process interesting, and the final results of this study will be made available to you at the conclusion of the study.

If you have any questions or concerns, please do not hesitate to contact Abdulrahman Alogaily by email (aralogai@syr.edu) or phone (+1- ).

Sincerely,

Abdulrahman Alogaily | Ph.D. Candidate

Instructional Design, Development and Evaluation

SYRACUSE UNIVERSITY | SCHOOL OF EDUCATION

Email

**In this first round**, you are asked to provide your opinion on the extent to which multimedia learning principles have been used in an advance organizer. The advance organizer in this study is specifically concerned with the main elements of research as defined in the literature – Philosophical assumptions, Paradigms, Praxis (3Ps).

The advance organizer has been divided into 5 main parts, as shown in the figure below.

You are asked to provide your response to both open and closed questions in a matrix table below each part of the advance organizer.

At the end of this questionnaire is a comprehensive evaluation of the design elements and principles used in the advance organizer.

You can also add a sketch/graph for further description by printing or taking a screenshot of the design and then dragging it into the upload box shown at the end of the questionnaire.

You will be prompted to provide recommended clarifications, comments, and suggestions on any multimedia learning principle that may improve the advance organizer. This round is expected to take approximately 25 minutes to complete.

Participants will receive an analysis of the feedback shared in the Delphi by 11/20/2020.

At that time, you will also be provided access to the next round of the Delphi which includes a new rubric and a revised version of the advance organizer based on experts' opinions from the previous round.

#### **Brief information about the advance organizer**

Advance organizers help facilitate meaningful learning by mentally assisting students in gaining new knowledge, retaining knowledge already learned, and integrating the information into their knowledge structures. This occurs because well-designed advance organizers help learners organize general concepts that concisely introduce content and connect new content information to learners' prior knowledge.

According to the literature, an advance organizer, in general, appears in several patterns: infographic, concept map, graphic presentation or table, slide-verbal presentation, a 200-500 word prose passage, a single sentence, an audio presentation, an "organizer" lesson, a "thematic" organizer in the form of a picture, an empty matrix with the horizontal and vertical axes specified, or a concrete model.

In this study, the advance organizer used is a static (non-interactive) learning tool.

Accordingly, the principles applied in this study relate to static multimedia only. Therefore, principles relating to sound, animation and/or video will not be studied or included. Here are some important questions and answers regarding the advance organizer:

To whom will this advance organizer be presented?

It will be presented to novice researchers and graduate students.

**What are the prerequisites learners should complete before using the advance organizer?**

Learners should complete two basic courses in Research Methods prior to using the advance organizer.

**How is this advance organizer presented?**

It can be presented digitally or in hardcopy.

What is the language provided in this advance organizer?

English

Is this advance organizer interactive?

No, it is not an interactive tool.

Does this advance organizer require instructions for use?

No, the learner will get to know how to use it by navigating the tool.

How will knowledge be acquired with this tool?

By reducing extraneous processing, managing essential processing, and increasing germane processing through optimizing multimedia learning principles.

- Extraneous processing refers to cognitive processing that does not support the instructional objectives and is caused by poor instructional design.
- Essential processing refers to cognitive processing aimed at mentally representing the presented material in working memory and is caused by the material's complexity.
- Generative processing refers to cognitive processing to make sense of the presented material and is caused by the learner's motivation to learn.

Does this advance organizer require an accompanying explanation for use?

No, it is not necessary, especially if the learner has prior knowledge of research, such as knowledge about research methods and techniques and philosophical worldviews in research.

Are there restrictions on using this advance organizer after being validated and approved?

There are no restrictions on using this tool for non-profit academic purposes.

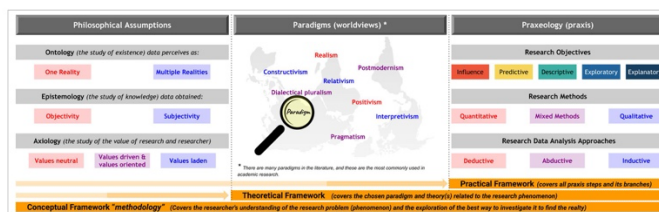
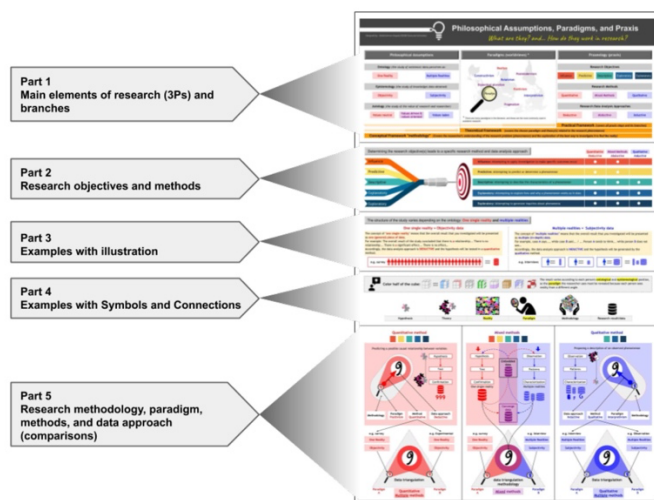
How should learners navigate the advance organizer content?

Generally, one should go from top to bottom, and inside each part, from left to right.

**Please remember: the advance organizer in this study is a static (non-interactive) learning tool!**

#### The Advance Organizer of the main elements of research

The parts developed in the advance organizer aim to enable learners to obtain information in a hierarchical manner that contributes to deciphering the complexities surrounding the research elements and their application mechanism. However, in order to achieve the general purpose of the advance organizer, it must be presented as one whole representation to the learners (the entire scheme) as shown here. >>>

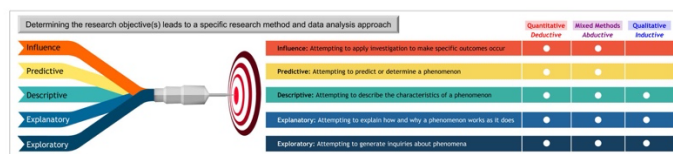


After reviewing Part 1 of the advance organizer, learners will be able to:

- Recognize the main elements of research and their branches.
- Define the conceptual, theoretical, and practical frameworks, and their relationship to each other.
- Classify the components of philosophical assumptions in the research.
- Identify examples of philosophical perspectives (paradigms).
- Relate research objectives with appropriate philosophical assumptions and paradigms.
- Associate the praxis components with appropriate paradigms and assumptions.

Based on **Part 1** above of the advance organizer and the expected learning objectives, to what extent do you think the following multimedia learning principles have been used?

	(Please select your choice)						Your feedback/opinion
	I think the multimedia learning principle is...						
	High extent	Moderate extent	Fair extent	Low extent	Not at all	I am not sure	Please provide justification for your choice
<b>Coherence principle</b> <i>People learn more deeply when extraneous words, pictures, or sounds are excluded rather than included.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Signaling principle</b> <i>People learn more deeply when adding signs that highlight key ideas and word organization.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Spatial Contiguity principle</b> <i>People learn more deeply when corresponding words and images are presented close together on a page or screen.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Modality principle</b> <i>People learn more deeply from narrations and graphics than on-screen text and animation.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Multimedia principle</b> <i>People learn more deeply when the learning tool comprises words and pictures instead of just words.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Personalization principle</b> <i>People learn more deeply when the learning tool contains words in conversational style instead of the formal style.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Another principle you think should be added: <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>

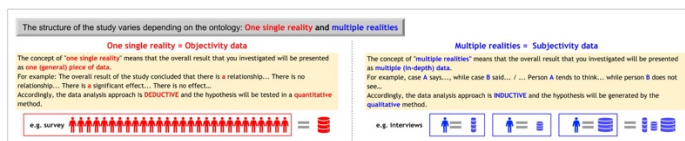


After reviewing Part 2 of the advance organizer, learners will be able to:

- Define the main objectives of the research.
- Classify research objectives based on research methods and approaches.
- Recognize the connection between research methods and research approaches.

Based on **Part 2** above of the advance organizer and the expected learning objectives, to what extent do you think the following multimedia learning principles have been used?

[illegible]



After reviewing Part 3 of the advance organizer, learners will be able to:

- Identify the branches of ontology and epistemology and their connection to research methods and approaches.
- Provide an example of one single reality and multiple realities in research.
- Provide an example of objective and subjective data.

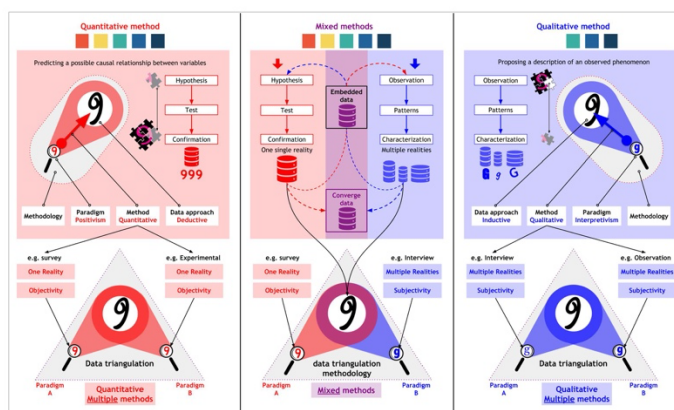
Based on **Part 3** above of the advance organizer and the expected learning objectives, to what extent do you think the following multimedia learning principles have been used?





Based on **Part 4** above of the advance organizer and the expected learning objectives, to what extent do you think the following multimedia learning principles have been used?

	(Please select your choice) I think the multimedia learning principle is ...						Your feedback/opinion
	High extent	Moderate extent	Fair extent	Low extent	Not at all	I am not sure	Please provide justification for your choice
<b>Coherence principle</b> <i>People learn more deeply when extraneous words, pictures, or sounds are excluded rather than included.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input style="width: 100%;" type="text"/>
<b>Signaling principle</b> <i>People learn more deeply when adding signs that highlight key ideas and word organization.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input style="width: 100%;" type="text"/>
<b>Spatial Contiguity principle</b> <i>People learn more deeply when corresponding words and images are presented close together on a page or screen.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input style="width: 100%;" type="text"/>
<b>Modality principle</b> <i>People learn more deeply from narrations and graphics than on-screen text and animation.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input style="width: 100%;" type="text"/>
<b>Multimedia principle</b> <i>People learn more deeply when the learning tool comprises words and pictures instead of just words.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input style="width: 100%;" type="text"/>
<b>Personalization principle</b> <i>People learn more deeply when the learning tool contains words in conversational style instead of the formal style.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input style="width: 100%;" type="text"/>
Another principle you think should be added:  <div style="border: 1px solid black; height: 40px;"></div>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input style="width: 100%;" type="text"/>



After reviewing Part 5 of the advance organizer, learners will be able to:

- Identify the main steps in conducting qualitative, quantitative, and mixed-methods research.
- Recognize the difference between qualitative, quantitative, and mixed research procedures.
- Differentiate between triangulation of data in the methodology and triangulation of data in methods.
- Identify the steps of the conceptual framework (methodology) and its pillars.
- Classify the types of mixed-methods research and how to conduct each type.

Based on Part 5 above of the advance organizer and the expected learning objectives, to what extent do you think the following multimedia learning principles have been used?





You can add a sketch/graph for further description by printing or taking a screenshot of the advance organizer above and making markups, and then dragging it into the upload box below.

Please provide your opinion on the extent to which the multimedia learning principles used in the advance organizer contribute to extraneous, essential, and germane processing by responding to the following statements.

*Note that: extraneous processing refers to cognitive processing that does not support the instructional objectives and is caused by poor instructional design, essential processing refers to cognitive processing aimed at mentally representing the presented material in working memory and is caused by the material's complexity, and generative processing refers to cognitive processing to make sense of the presented material and is caused by the learner's motivation to learn.*

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree
The multimedia learning principles used in this advance has contributed to <b>reducing extraneous processing.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The multimedia learning principles used in this advance has contributed to <b>managing essential processing.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The multimedia learning principles used in this advance has contributed to <b>increasing germane processing.</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To what extent do you think the following design elements and principles have been used in the overall advance organizer?

	(Please select your choice) I think the design element/principle is ...				If you think the design element or principle is not used or unclear please provide suggestions on how to use it.  Your feedback/opinion
	High extent	Moderate extent	Poor extent	Not at all	
<b>Contrast</b> <i>The arrangement of opposite items: e.g., light and dark colors, and large and small shapes.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Repetition</b> <i>Reusing the same or similar items throughout the design.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Alignment</b> <i>Each item is visually connected via an invisible line, which means nothing in the design should look like it's placed there randomly.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Proximity</b> <i>Grouping similar or related items to emphasize their relationship. Plus, unlike or unrelated items should be spaced further apart to emphasizing their lack of relationship.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Color</b> <i>Consistency and harmony of the colors used</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Typography</b> <i>The written language is legible, readable, and attractive.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Hierarchy</b> <i>Arrange the design items and blocks according to their importance.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Balance</b> <i>Distribution of visual weight in the design.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Space</b> <i>Spaces within and between visual elements - it's an integral part of the information.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
<b>Direction</b> <i>Direct the viewer's eye from point to point by direction to achieve the goal of the message.</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>
Suggest other elements or principles <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/>

Comments about the overall advance organizer:

## Appendix 9 Novice Researchers Invitation Letter

### Novice Researchers Invitation Letter

Dear .....

Good morning!

You are invited to participate in a research study on researchers' perceptions and impressions about the main research elements. The investigator invites researchers (graduate students) to participate in this study. This study is being conducted by Abdulrahman Alogaily, a PhD candidate in the Instructional Design, Development and Evaluation Program at Syracuse University's School of Education. The research is being supervised by Dr. Tiffany A. Koszalka, professor of Instructional Design, Development and Evaluation.

This study seeks to explore researchers' perceptions of the main elements of research and their impressions on the use of an advance organizer as "*a learning tool*" on the main elements of research.

#### Requirements for study participants be:

- Master's or Doctoral student
- Completed at least two graduate-level research courses over the last two years
- Required to conduct academic research.

#### Time of participation:

The interview will be conducted in four parts in one timeframe, approximately 60 minutes: 1- questions and discussion about your perception of the main elements of the research, 2- a review of an advance organizer about the main elements of research and a presentation of how to use the advance organizer, 3- closed and open questions about main elements of research, their relationship to one another, and their application in research, 4- and finally your impression of the advance organizer that will be presented to you.

The interview will be conducted online, you should be available for about 60 minutes, knowing that the interview will be recorded.

#### Payment:

Participating in 25% of the interview (about 15 minutes) will earn you a \$10 gift card, up to 50% (~ 30 min) will earn you a \$20 gift card, up to 75% (~ 45 min) will earn a \$30 gift card, up to 100% will earn you a **\$100 gift card**. The gift card will be delivered within three business days after the interview.

#### Voluntary Participation and Withdrawal:

Your participation in this research study is voluntary. You may refuse to participate without penalty. If you decide to participate, you are free to stop at any time without penalty by just

stopping and/or telling the investigator.

**Contacts and Questions:**

You may ask any questions you have now. Or if you have questions later, you may contact the researcher via phone at (\*\*\*) \*\*\*-\*\*\*\* or via email at [aralogai@syr.edu](mailto:aralogai@syr.edu). If you would like to talk privately about your rights as a participant, you may call the Research Participant Advocate at my university (315) 443-3013. Syracuse University's approval number for this study is 20-354 and it expires on January 12, 2026.

If you are willing to consent and participate in this research, please complete the following short survey regarding your demographic and research background. This survey will not take more than **5 minutes**. Following this survey, you will be contacted to set an appropriate interview date for you.

[https://syracuseuniversity.qualtrics.com/jfe/form/SV\\_9G1ebpdXnfer2vQ](https://syracuseuniversity.qualtrics.com/jfe/form/SV_9G1ebpdXnfer2vQ)

Best Regards,

**Abdulrahman Alogaily** | Ph.D. Candidate  
Instructional Design, Development and Evaluation  
259 Huntington Hall  
Syracuse, New York 13244  
e [aralogai@syr.edu](mailto:aralogai@syr.edu)  
**SYRACUSE UNIVERSITY** | SCHOOL OF EDUCATION  
<http://soe.syr.edu> / <http://idde.syr.edu>



*Appendix 10 Written Consent letter for interviewing Novice researchers*

**CONSENT LETTER**

- I voluntarily agree to participate in this research study that seeks to explore researchers' perceptions of the main elements of research and their impressions on the use of an advance organizer as “a learning tool” on the main elements of research.
- I understand that my participation is voluntary and that I can withdraw from the study at any time without penalty.
- I understand that I can withdraw permission to use data from my interview within two days after the interview, in which case the material will be deleted.
- I understand that I will receive a gift card within three business days of completing the interview.
- I have had the purpose and nature of the study explained to me in writing, and I have had the opportunity to ask questions about the study.
- I understand that participation includes my perceptions of the main elements of the research and my impression of using an advance organizer on the main elements of research in research thinking and practice.
- I agree to my interview being audio-recorded.
- I understand that all information I provide for this study will be treated confidentially.
- I understand that my identity will remain anonymous in any report on the results of this research. This will be done by changing my name and disguising any details of my identity in the interview.
- I understand that disguised extracts from my interview may be quoted in any report on the results of this research.
- I understand that signed consent forms digitally and original audio recordings will be retained in a secure, password-protected computer, and the researcher and his advisor will be the only ones who can access these data.
- I understand that all personally identifiable information will be destroyed after the research is defended, by deleting all electronic copies of personally identifiable information.
- I understand that whenever one works with email or the internet; there is always the risk of compromising privacy, confidentiality, and/or anonymity. Your confidentiality will be maintained to the degree permitted by the technology being used.

about the research, you should contact the researcher Abdulrahman Alogaily via email (aralogai@syr.edu) or at (\*\*) \*\*\*-\*\*\*\*. If you have questions about your rights as a research subject, you should contact the Institutional Review Board (IRB) at Syracuse University at (315) 443-3013, orip@syr.edu. Your participation is entirely voluntary. If you decide not to participate or withdraw from the study, this will not impact your personal, professional, or educational life.

By typing your name, signing, and submitting this document, you are indicating that you will participate and that you have read, fully understand, and agree to the terms of this agreement.

Name of Participant (please type):

Phone number

Email

E- signature

×

SIGN HERE

clear

Powered by Qualtrics

*Appendix 11 ORAL Consent letter for interviewing Novice researchers*

**ORAL CONSENT LETTER DURING THE INTERVIEW**

**Interview Protocol Title:** ... ..

**Interview with Participant number:**

**Date:**

**Time of interview:**

**Location of interview:**

Opening [READ]: "Hello! It is nice to meet you! As you are aware, my name is Abdulrahman Alogailly. Thank you for being willing to participate in my research study.

As I mentioned in my initial contact letter, I am a doctoral candidate at Syracuse University in the Instructional Design, Development and Evaluation program. I am conducting this study on researchers' perceptions and impressions of an advance organizer on main elements of research.

This study aims to explore researchers' perceptions and impressions of an advance organizer on the main elements of research.

The interview will be conducted in four parts in one timeframe, approximately 60 minutes: 1- questions and discussion about your perception of the main elements of the research, 2- a review of an AO about the main elements of research and an educational presentation of how to use the AO, 3- closed and open questions about main elements of research, their relationship to one another, and their application in research, 4- and finally your impression of the advance organizer that was introduced.

To maintain your confidentiality, I have assigned a number to you. I will paraphrase your comments if you make a statement that would portray your identity or your program's identity. Any identifying information will be rendered anonymous in the transcripts. All documents, emails, and transcripts that contain personal identification information, such as your name, name of your institution, and email address, will be secured in a password-protected computer. I am the only person who has access to the computer and will only share documents rendered anonymous with my advisor. I will destroy all personal identification information after completing and defending the dissertation by deleting all electronic copies of the personal identification information.

Your participation in this study is voluntary and you can withdraw at any time without penalty. Participating in 25% of the interview (about 15 minutes) will earn you a \$10 gift card, up to 50% (~ 30 min) will earn you a \$20 gift card, up to 75% (~ 45 min) will earn a \$30 gift card, up to 100% will earn you a \$100 gift card. Gift card will be delivered within three business days after the interview.

If you have questions about the research, you should contact the researcher Abdulrahman Alogaily via email (aralogai@syr.edu) or at (\*\*\*) \*\*\*-\*\*\*\*. If you have questions about your rights as a research subject, you should contact the Institutional Review Board (IRB) at Syracuse University at (315) 443-3013, orip@syr.edu.

By uttering your name and the phrase “I consent,” you indicate that you have listened and fully understand the terms of this interview and agreed to take place, and you are certifying that you are older than 18 years of age.

Thank you for digitally signing the informed consent document. I want to re-confirm that I have your permission to audio-record this interview. [PARTICIPANT RESPONSE].

*(If the participant wishes not to record the interview, he/she will be thanked and stop the interview)*

Thank you!

## *Appendix 12 Demographic and Research Background Survey for Novice researchers*

Dear participant,

As an introductory procedure to the interview and to help me learn more about your demographic and research background, I would like you to answer the following short questionnaire: *(It shouldn't take more than 5 minutes)*

Please provide the information below: *(Note that your name and email address will not be shared with anyone and will not be used in the study reports. This information is only required to contact you for the interview, as indicated in the consent letter)*

First name

last name

Email

What is your gender?

- ☐ Male
- ☐ Female
- ☐  Other (specify)

What is your age?

- ☐ 20 to 29
- ☐ 30 to 39
- ☐ 40 to 49
- ☐ 50 or above

What is the highest degree or level of school you have completed? *(If you are currently enrolled in school, please specify the degree you are currently studying.)*

- ☐ Doctorate of Philosophy (Ph.D.)
- ☐ Doctorate of Education (Ed.D.)
- ☐ Master of Arts (MA)
- ☐ Master of Science (MS, MSc)
- ☐  Other (specify)

Select the field of the research you are interested in:

- ☐ Social Science Research (Human subjects e.g., education, anthropology, history, philosophy, law, etc.)
- ☐ Natural Sciences Research (Scientific subjects e.g., chemistry, computers, mathematics, engineering, etc.)
- ☐  Other (specify)

How many research papers have you published in scholarly refereed journals (including papers accepted for publication)? *"Please type a number of papers"*

How long have you been practicing research? *"Please type the number of years"*

How many research courses have you studied during your graduate level?

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Number of qualitative research courses

Number of quantitative research courses

Number of mixed methods research courses

Other research course-related (specify):

What is your level of knowledge or understanding of the following items related to research?

	None	Low	Moderate	High
Defining Research Problem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Defining research objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Developing research questions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Philosophical Worldviews (Paradigms)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Philosophical Assumptions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ontology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Epistemology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Axiology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research Methods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research Methodology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research Data Analysis Approaches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data Collection and Techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data Interpretation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Theoretical Framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conceptual Framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Practical Framework	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Qualitative method	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quantitative method	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mixed methods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Another related research concept (specify):	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="text"/>				



### *Appendix 13 Interview questions for Novice researchers*

#### **Interview questions for Novice researchers**

<b>Part 2</b>	
Title:	Participants' perceptions of the main elements of research
With:	Graduate students Individually
Where:	Online synchronous interview
Preconditions:	Complete the demographic and research background survey
Total time:	15 minutes

The participants will be asked the following questions:

1. What is the actual starting point of conducting research? / How do you to start a research project?
2. What does having a philosophical assumption mean in research?
  - a. Give an example of a philosophical assumption.
3. What does having a philosophical worldview mean in research?
  - a. Give an example of a worldview/ paradigm.
4. Describe the concept of a theoretical framework?
5. What are the research methods?
  - a. How do you differentiate between research methods?

<b>Part 3</b>	
<i>As there will be two groups (4 participants individually interviewed from each group), this part will be presented as a third step for group A and as a fourth step for group B.</i>	
Title:	Presentation of an advance organizer of main elements of research (3Ps)
With:	Graduate students Individually
Where:	Online synchronous interview
Preconditions:	Complete part 1
Total time:	20 minutes

**Presenting an AO of the main elements of research**

**5 minutes**

- [ RESEARCHER:] I'm going to show you an advance organizer “*learning tool*”, and I'd like you to explore it for about 5 minutes, and then I'll ask you some questions about it?

**After that, the interviewees will be asked the following questions: 10 minutes**

1. Describe your first impression when you see this advance organizer?
2. Describe what this advance organizer is portraying?
3. What part of this advance organizer do you think you are most familiar with? and Why?

**4. An educational presentation of how to use the AO of the main elements of research: 10 minutes**

The investigator [me] will introduce the advance organizer during the interview and explain it to the participants.

Part 4	
Title:	Open-ended and closed-ended questions
With:	Graduate students Individually
Where:	Online synchronous interview
Preconditions:	Complete part 2
Total time:	15 minutes

*The participants will answer the following questions through an electronic link, which they will be provided upon reaching this part (#4).*

The test time is 15 minutes.

No sources are allowed during the test

Please fill in the following information, then answer the ten questions. Answer the questions in the order as they appear. It is not possible to return to the previous question.

After completing the questions, please click **Submit**.

Name

Email

Q1. How do you differentiate between research methods and research methodology?

Q2. What is the role of a paradigm in research?

Q3. What is the philosophical assumption for the following definition? *“Beliefs about the nature of being and the characteristics of reality”*

Q4. What is the philosophical assumption for the following definition “*Beliefs about the nature of knowledge and how knowledge is acquired*”?

Q5. What does the meaning of Methods Triangulation and Methodological Triangulation? *Write or draw a figure that illustrates your answer.*

Q6. Match the terms with their definition.

- Conceptual Framework “methodology”
- Theoretical Framework
- Practical Framework

Definitions: >

- A framework that covers all praxis steps and its branches
- A framework that covers the chosen paradigm and theory/theories related to the research phenomenon
- A framework that covers the researcher's understanding of the research problem (phenomenon) and the exploration of the best way to investigate it to find the reality



<b>Part 5</b>	
Title:	Participants' perceptions of the AO of the main elements of research
With:	Graduate students Individually
Where:	Online synchronous interview
Preconditions:	Complete part 3
Total time:	10-15 minutes

The participants will be asked the following questions:

- What is your impression of the ability to learn about the main elements of research from this advance organizer?
- What can be done to improve learning about the main elements of research from this advance organizer?
- If you were responsible for this advance organizer, what would be the most important thing you would add or change? and Why?
- If you were responsible for this advance organizer, what would be the most important thing to exclude or remove? and Why?
- What would a research novice need to already know or have done to benefit the most from this advance organizer?
- In general, how would you describe your experience in exploring this advance organizer during this interview?

## REFERENCES

- Addis, M., & Winch, C. (Eds.). (2019). *Education and Expertise*. Wiley.
- Adesope, O. O., & Nesbit, J. C. (2012). Verbal redundancy in multimedia learning environments: A meta-analysis. *Journal of Educational Psychology*, 104(1), 250–263.  
<https://doi.org/10.1037/a0026147>
- Afamasaga-Fuata’i, K. (2009). Concept Mapping in Mathematics. In K. Afamasaga-Fuata’i (Ed.), *Concept Mapping in Mathematics: Research into Practice*. Springer US.  
<https://doi.org/10.1007/978-0-387-89194-1>
- Alogaily, A., & Koszalka, T. A. (2020). The Main Elements of Research: A Thematic Analysis of Research Literature. *Under Review*.
- Alpizar, D., Adesope, O. O., & Wong, R. M. (2020). A meta-analysis of signaling principle in multimedia learning environments. *Educational Technology Research and Development*, 68(5), 2095–2119. <https://doi.org/10.1007/s11423-020-09748-7>
- Amadiou, F., Mariné, C., & Laimay, C. (2011). The attention-guiding effect and cognitive load in the comprehension of animations. *Computers in Human Behavior*, 27(1), 36–40.  
<https://doi.org/10.1016/j.chb.2010.05.009>
- Antiwi, S. K., & Hamza, K. (2015). Qualitative and Quantitative Research Methods in Business Research: A Philosophical Reflection. *European Journal of Business and Management*, 7(3), 217–225.
- Antonenko, P. D. (2014). The instrumental value of conceptual frameworks in educational technology research. *Educational Technology Research and Development*.  
<https://doi.org/10.1007/s11423-014-9363-4>

- Aspers, P., & Corte, U. (2019). What is Qualitative in Qualitative Research. *Qualitative Sociology*, 42(2), 139–160. <https://doi.org/10.1007/s11133-019-9413-7>
- Audi, R. (2011). *Epistemology: A Contemporary Introduction to the Theory of Knowledge: Vol. 3rd ed.* Routledge. <https://libezproxy.syr.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=e000xna&AN=336574&site=ehost-live>
- Austin, K. A. (2009). Multimedia learning: Cognitive individual differences and display design techniques predict transfer learning with multimedia learning modules. *Computers and Education*. <https://doi.org/10.1016/j.compedu.2009.06.017>
- Ausubel, D. P. (1960). The use of advance organizers in the learning and retention of meaningful verbal material. *Journal of Educational Psychology*. <https://doi.org/10.1037/h0046669>
- Ausubel, D. P. (1978). In Defense of Advance Organizers: A Reply to the Critics. *Review of Educational Research*. <https://doi.org/10.3102/00346543048002251>
- Ausubel, D. P. (2000). The Acquisition and Retention of Knowledge: A Cognitive View. In *The Acquisition and Retention of Knowledge: A Cognitive View*. <https://doi.org/10.1007/978-94-015-9454-7>
- Avgousti, K. (2013). RESEARCH PHILOSOPHY, METHODOLOGY, QUANTITATIVE AND QUALITATIVE METHODS. *The Cyprus Journal of Sciences*, 11, 33–43.
- Avramidis, E., & Smith, B. (1999). AN INTRODUCTION TO THE MAJOR RESEARCH PARADIGMS AND THEIR METHODOLOGICAL IMPLICATIONS FOR SPECIAL NEEDS RESEARCH. *Emotional and Behavioural Difficulties*, 4(3), 27–36. <https://doi.org/10.1080/1363275990040306>



- Bagnoli, C. (Ed.). (2013). *Constructivism in Ethics*. Cambridge University Press.  
<https://doi.org/10.1017/CBO9781139094221>
- Balcerak Jackson, M., & Balcerak Jackson, B. (2012). Understanding and philosophical methodology. *Philosophical Studies*, 161(2), 185–205. <https://doi.org/10.1007/s11098-011-9729-y>
- Baldwin, A. (2014). Putting the philosophy into PhD. *Working Papers in the Health Sciences*, 1–4.
- Banikowski, A. K., & Mehring, T. A. (1999). Strategies to enhance memory based on brain-research. *Focus on Exceptional Children*. <https://doi.org/10.17161/foec.v32i2.6772>
- Barbara, G., & Giddings, L. (2002). Making sense of methodologies: A paradigm framework for the novice researcher. In *Contemporary nurse: A journal for the Australian nursing profession*. <https://doi.org/10.5172/conu.13.1.10>
- Baxter, P., & Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *The Qualitative Report*, 13(4), 544–559.
- Bazeley, P., & Jackson, K. (2013). *Qualitative Data Analysis with NVivo* (2nd ed.). SAGE.
- Beattie, J. (2002). Purists, eclectics, muddlers and movers: A caution on categorising. *Nursing Inquiry*. <https://doi.org/10.1046/j.1440-1800.2002.00122.x>
- Becker, K. (2016). Choosing and Using Digital Games in the Classroom – A Practical Guide. In *Advances in Game-Based Learning*.
- Beghetto, R. A., & Corazza, G. E. (Eds.). (2019). *Dynamic Perspectives on Creativity: New Directions for Theory, Research, and Practice in Education* (1st ed. 2019 edition). Springer.

- Bekhet, A. K., & Zauszniewski, J. A. (2012). Methodological triangulation: An approach to understanding data. *Nurse Researcher*. <https://doi.org/10.7748/nr2012.11.20.2.40.c9442>
- Bendassolli, P. F. (2013). Theory building in qualitative research: Reconsidering the problem of induction. *Forum Qualitative Sozialforschung*. <https://doi.org/10.17169/fqs-14.1.1851>
- Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open*. <https://doi.org/10.1016/j.npls.2016.01.001>
- Bhattacharjee, A. (2012). Social Science Research: Principles, methods, and practices. In *Book 3*.
- Biddle, C., & Schafft, K. A. (2015). Axiology and Anomaly in the Practice of Mixed Methods Work: Pragmatism, Valuation, and the Transformative Paradigm. *Journal of Mixed Methods Research*. <https://doi.org/10.1177/1558689814533157>
- Biser, E. (1984). Application of Ausubel's theory of meaningful verbal learning to curriculum, teaching and learning of deaf students. *International Symposium on Cognition, Education, and Deafness*.
- Bodemer, D., Ploetzner, R., Feuerlein, I., & Spada, H. (2004). The active integration of information during learning with dynamic and interactive visualisations. *Learning and Instruction*, 14(3), 325–341. <https://doi.org/10.1016/j.learninstruc.2004.06.006>
- Bogdan, R., & Biklen, S. K. (2006). *Qualitative Research for Education: An Introduction to Theories and Methods, Fifth Edition* (5th edition). Pearson.
- Bosch, G. (2018). Train PhD students to be thinkers not just specialists. *Nature*, 554(7692), 277–277. <https://doi.org/10.1038/d41586-018-01853-1>
- Boucheix, J.-M., & Lowe, R. K. (2010). An eye tracking comparison of external pointing cues and internal continuous cues in learning with complex animations. *Learning and Instruction*, 20(2), 123–135. <https://doi.org/10.1016/j.learninstruc.2009.02.015>

- Boucheix, J.-M., Lowe, R. K., Putri, D. K., & Groff, J. (2013). Cueing animations: Dynamic signaling aids information extraction and comprehension. *Learning and Instruction*, 25, 71–84. <https://doi.org/10.1016/j.learninstruc.2012.11.005>
- Boucheix, J.-M., & Schneider, E. (2009). Static and animated presentations in learning dynamic mechanical systems. *Learning and Instruction*, 19(2), 112–127. <https://doi.org/10.1016/j.learninstruc.2008.03.004>
- Boyle, T. B. (2019). *Three Case Studies of Factors Related to Non-Completion of Doctorate Degree Then Doctoral Degree Attainment Through a Degree Completion Program at a Different Institution* [Dissertations]. Gwynedd Mercy University.
- Boychev, P. (2015). Constructionism and deconstructionism. *Constructivist Foundations*.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2013). *Successful Qualitative Research: A Practical Guide for Beginners*. SAGE Publications Ltd.
- Brinkmann, S. (2017). John dewey: Science for a changing world. In *John Dewey: Science for a Changing World*. <https://doi.org/10.4324/9780203787908>
- Broek, G. S. E. van den, Segers, E., & Verhoeven, L. (2014). Effects of text modality in multimedia presentations on written and oral performance. *Journal of Computer Assisted Learning*, 30(5), 438–449. <https://doi.org/10.1111/jcal.12058>
- Brown, M. E. L., & Dueñas, A. N. (2019). A Medical Science Educator's Guide to Selecting a Research Paradigm: Building a Basis for Better Research. *Medical Science Educator*. <https://doi.org/10.1007/s40670-019-00898-9>

- Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, 6(1), 97–113. <https://doi.org/10.1177/1468794106058877>
- Bullard, L. H. (2018). *The Effects of Using Interactive Geometry Software Applications as Advance Organizers on Students' Development of Conceptual Understanding and Satisfaction in Learning Middle School Mathematics*. United States - Alabama.
- Carney, T. F. (1992). Storyboarding. *ACM SIGDOC Asterisk Journal of Computer Documentation*, 16(3), 27–40. <https://doi.org/10.1145/142350.142358>
- Carpi, A., & Egger, A. E. (2008). *Research Methods: Comparison in Scientific Research*. Visionlearning. <https://www.visionlearning.com/en/library/Process-of-Science/49/Comparison-in-Scientific-Research/152>
- Casanave, C., & Li, Y. (2015). Novices' Struggles with Conceptual and Theoretical Framing in Writing Dissertations and Papers for Publication. *Publications*. <https://doi.org/10.3390/publications3020104>
- Cassell, C., Cunliffe, A., & Grandy, G. (2018). *The SAGE Handbook of Qualitative Business and Management Research Methods: History and Traditions*. SAGE Publications Ltd. <https://doi.org/10.4135/9781526430212>
- Cassell, C., & Symon, G. (2004). *Essential Guide to Qualitative Methods in Organizational Research*. <https://doi.org/10.4135/9781446280119>
- Cellucci, C. (2014). Rethinking Philosophy. *Philosophia*, 42(2), 271–288. <https://doi.org/10.1007/s11406-013-9497-3>
- Chalmers, A. F. (2013). *What is This Thing Called Science?* (Fourth edi). Hackett Publishing Company, Inc.

- Chen, B. (2007). Effects of advance organizers on learning and retention from a fully Web-based class. In *ProQuest Dissertations and Theses*. University of Central Florida.
- Chen, Baiyun; Hirumi, Atsusi; Zhang, N. J. (2007). Investigating the Use of Advance Organizers as an Instructional Strategy for Web-Based Distance Education. *The Quarterly Review of Distance Education*, 8(3), 223–231.
- Chen, D. T. V., Wang, Y. M., & Lee, W. C. (2016). Challenges confronting beginning researchers in conducting literature reviews. *Studies in Continuing Education*. <https://doi.org/10.1080/0158037X.2015.1030335>
- Chen, O., Castro-Alonso, J. C., Paas, F., & Sweller, J. (2018). Extending Cognitive Load Theory to Incorporate Working Memory Resource Depletion: Evidence from the Spacing Effect. *Educational Psychology Review*. <https://doi.org/10.1007/s10648-017-9426-2>
- Christie, D. J., & Schumacher, G. M. (1976). Some Conditions Surrounding the Effectiveness of Advance Organizers for Children's Retention of Orally Presented Prose. *Journal of Reading Behavior*, 8(3), 299–309. <https://doi.org/10.1080/10862967609547184>
- Ciechanowska, D. (2018). *The application of ausubel's meaningful learning theory in the organization of knowledge representations on concept maps* (pp. 105–114). Pedagogika.
- Cierniak, G., Scheiter, K., & Gerjets, P. (2009). Explaining the split-attention effect: Is the reduction of extraneous cognitive load accompanied by an increase in germane cognitive load? *Computers in Human Behavior*, 25(2), 315–324. <https://doi.org/10.1016/j.chb.2008.12.020>
- Ciesielska, M., & Jemielniak, D. (2018). Qualitative Methodologies in Organization Studies. In M. Ciesielska & D. Jemielniak (Eds.), *Palgrave Macmillan*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-65217-7>

- Clark, R. C., & Lyons, C. (2011). *Graphics for learning: Proven guidelines for planning, designing, and evaluating visuals in training materials* (2 edition, p. 432 pages). Pfeiffer.
- Clark, R. C., & Mayer, R. E. (2016a). *e-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning* (4th ed.). Wiley.
- Clark, R. C., & Mayer, R. E. (2016b). *e-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning* (4th ed., p. 531). Wiley.
- Clarke, V., & Braun, V. (2017). Thematic analysis. *Journal of Positive Psychology*, 12(3), 297–298. <https://doi.org/10.1080/17439760.2016.1262613>
- Cochran, W. G. (1977). *Sampling Techniques* (3rd edition, Ed.; John Wiley).
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education* (p. 944). Routledge.
- Colombo, B., & Antonietti, A. (2013). Naïve conceptions about multimedia learning: A study on primary school textbooks. *Frontiers in Psychology*, 4. <https://doi.org/10.3389/fpsyg.2013.00450>
- Comments on: A Knowledge Concept Map: Structured Concept Analysis from Systematic Literature Review.* (2017). [https://www.researchgate.net/publication/322091545\\_A\\_Knowledge\\_Concept\\_Map\\_Structured\\_Concept\\_Analysis\\_from\\_Systematic\\_Literature\\_Review/comments](https://www.researchgate.net/publication/322091545_A_Knowledge_Concept_Map_Structured_Concept_Analysis_from_Systematic_Literature_Review/comments)
- Corden, A., Sainsbury, R., University of York, & Social Policy Research Unit. (2006). *Using verbatim quotations in reporting qualitative social research: Researchers' views.* University of York.

- Costa, A. P., Reis, L. P., & Moreira, A. (Eds.). (2020). *Computer Supported Qualitative Research: New Trends on Qualitative Research (WCQR2019)*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-31787-4>
- Cowan, N. (2009). What are the differences between long-term, short-term, and working memory? Nelson. *NIH Public Access*. [https://doi.org/10.1016/S0079-6123\(07\)00020-9](https://doi.org/10.1016/S0079-6123(07)00020-9).What
- Creswell, J. (2007). *Qualitative Inquiry & Research Design: Choosing among five approaches*. In *Sage Publications, Inc.*
- Creswell, J. (2012). Philosophical, Paradigm, and Interpretive Frameworks. *Qualitative Inquiry & Research Design: Choosing Among Five Approaches*. <https://doi.org/10.1016/j.aenj.2008.02.005>
- Creswell, J., & Creswell, D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Fifth Edit, p. 304). SAGE Publications, Inc.
- Creswell, J., & Plano Clark, V. (2018a). *Designing and conducting mixed methods research* (Third edit, p. 520). SAGE Publications, Inc.
- Creswell, J., & Plano Clark, V. (2018b). *Designing and conducting mixed methods research* (Third edit). SAGE Publications, Inc.
- Creswell, J., & Poth, Cheryl. (2017a). *Qualitative Inquiry and Research Design Choosing Among Five Approaches* (Fourth edi). SAGE Publications, Inc.
- Creswell, J., & Poth, Cheryl. (2017b). *Qualitative Inquiry and Research Design Choosing Among Five Approaches* (Fourth edi, p. 488). SAGE Publications, Inc.
- Crossan, F. (2003). Research philosophy: Towards an understanding. *Nurse Researcher*, 11(1), 46–55. <https://doi.org/10.7748/nr2003.10.11.1.46.c5914>

- Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process* (1 edition, p. 256). London ; Thousand Oaks, Calif. : Sage Publications.
- Croucher, S. M., & Cronn-Mills, D. (2018). Understanding Communication Research Methods: A Theoretical and Practical Approach. In *Routledge*.
- Cutrer, W. B., Castro, D., Roy, K. M., & Turner, T. L. (2011). Use of an expert concept map as an advance organizer to improve understanding of respiratory failure. *Medical Teacher*. <https://doi.org/10.3109/0142159X.2010.531159>
- Cypress, B. S. (2017). Rigor or Reliability and Validity in Qualitative Research: Perspectives, Strategies, Reconceptualization, and Recommendations. *Dimensions of Critical Care Nursing*, 36(4), 253–263. <https://doi.org/10.1097/DCC.0000000000000253>
- Dajani, J. S., Sincoff, M. Z., & Talley, W. K. (1979). Stability and agreement criteria for the termination of Delphi studies. *Technological Forecasting and Social Change*, 13(1), 83–90. [https://doi.org/10.1016/0040-1625\(79\)90007-6](https://doi.org/10.1016/0040-1625(79)90007-6)
- Daniel, K. J. (2005). Advance Organizers: Activating and Building Schema for More Successful Learning in Students with Disabilities. *Lynchburg College*, 22.
- Darmayanti, D., Simatupang, T. M., & Rudito, P. (2018). Lessons Learned for Novice Researcher from a Qualitative Study of a Case on Continuous Ambulatory Peritoneal Dialysis. *International Journal of Medical Research and Health Sciences VO* - 7.
- Davidson, B. J. (1997). Advance organizers in student-centered rich learning environments. In *ProQuest Dissertations and Theses*. University of Houston-Clear Lake.
- de Koning, B. B., Tabbers, H. K., Rikers, R. M. J. P., & Paas, F. (2010). Attention guidance in learning from a complex animation: Seeing is understanding? *Learning and Instruction*, 20(2), 111–122. <https://doi.org/10.1016/j.learninstruc.2009.02.010>



- Deitsch, F. K. (1985). *The Effect of Advance Organizers on Children's Processing of Text (Discourse Analysis, Schema, Semantic Organizer, Inferential Processes, Text Structure)*. Hofstra University.
- Denzin, N., & Lincoln, Y. (2017). The SAGE Handbook of Qualitative Research. In *SAGE Publication* (Fifth edit). SAGE Publications, Inc.
- Devlin, W. J., & Alisa, B. (2015). *Kuhn's Structure of Scientific Revolutions—50 Years On (Boston Studies in the Philosophy and History of Science)*. Springer.
- Doolittle, P. E., & Altstaedter, L. L. (2009). The Effect of Working Memory Capacity on Multimedia Learning: Does Attentional Control Result in Improved Performance? *Journal of Research in Innovative Teaching*, 2(1), 7–25.
- Dudovskiy, J. (2018). *The Ultimate Guide to Writing a Dissertation in Business Studies: A Step-by-Step Assistance* (p. 208).
- Duke, S. P., Bancken, F., Crowe, B., Soukup, M., Botsis, T., & Forshee, R. (2015). Seeing is believing: Good graphic design principles for medical research. *Statistics in Medicine*. <https://doi.org/10.1002/sim.6549>
- Dunlap, J. C., & Lowenthal, P. R. (2016). Getting graphic about infographics: Design lessons learned from popular infographics. *Journal of Visual Literacy*, 35(1), 42–59. <https://doi.org/10.1080/1051144X.2016.1205832>
- Durham, W., Sykes, C., Piper, S., & Stokes, P. (2015). Conceptual frameworks and terminology in doctoral nursing research. *Nurse Researcher*, 23(2), 8–12. <https://doi.org/10.7748/nr.23.2.8.s3>

- Eastman, P. M. (1977). The Use of Advance Organizers For Facilitating Learning and Transfer from Quadratic Inequalities. *School Science and Mathematics*.  
<https://doi.org/10.1111/j.1949-8594.1977.tb09266.x>
- Edmonds, W. A., & Kennedy, T. D. (2017). An Applied Guide to Research Designs Quantitative, Qualitative, and Mixed Methods Second Edition. In *An Applied Guide to Research Designs Quantitative, Qualitative, and Mixed Methods Second Edition*.
- Efinger, J., Maldonado, N., & McArdle, G. (2004). PhD students' perceptions of the relationship between philosophy and research: A qualitative investigation. *The Qualitative Report*.
- Egbert, J., & Sanden, S. (2013). Foundations of education research: Understanding theoretical components. In *Foundations of Education Research: Understanding Theoretical Components*. <https://doi.org/10.4324/9781315880518>
- Eitel, A., Scheiter, K., & Schüler, A. (2013). How Inspecting a Picture Affects Processing of Text in Multimedia Learning. *Applied Cognitive Psychology*, 27(4), 451–461.  
<https://doi.org/10.1002/acp.2922>
- Ellis, T., & Levy, Y. (2009). Towards a Guide for Novice Researchers on Research Methodology: Review and Proposed Methods. *Proceedings of the 2009 InSITE Conference*.  
<https://doi.org/10.28945/3325>
- Elshafie, M. (2013). Research Paradigms: The Novice Researcher's Nightmare. *Arab World English Journal*, 4(2), 4–13.
- Emden, C., & Sandelowski, M. (1998). The good, the bad and the relative, Part one: Conceptions of goodness in qualitative research. *International Journal of Nursing Practice*, 4(4), 206–212. <https://doi.org/10.1046/j.1440-172x.1998.00105.x>

- Engel, R., & Schutt, R. (2017). The Practice of Research in Social Work. In *SAGE Publications Incl.* (4th Editio).
- Erciyas, E. (2020). Paradigms of Inquiry in the Qualitative Research. *European Scientific Journal ESJ*, 16(7). <https://doi.org/10.19044/esj.2020.v16n7p181>
- Ericsson, K. A., Hoffman, R. R., Kozbelt, A., & Williams, A. M. (2018). *The Cambridge Handbook of Expertise and Expert Performance*. Cambridge University Press. <https://doi.org/10.1017/9781316480748>
- Ericsson, K. A., Prietula, M. J. :, & Cokely, E. T. (2007). The Making of an Expert. *Harvard Business Review*.
- Ernest, P. (2016). The unit of analysis in mathematics education: Bridging the political-technical divide? *Educational Studies in Mathematics*, 92(1), 37–58. <https://doi.org/10.1007/s10649-016-9689-4>
- Fann, K. T. (1970). *Peirce's Theory of Abduction*. Springer Netherlands.
- Farr, B. P. (1975). *The Effect of Thematic Organizers on Comprehension*. Indiana University.
- Finlay, L. (2002). Negotiating the swamp: The opportunity and challenge of reflexivity in research practice. *Qualitative Research*, 2(2), 209–230. <https://doi.org/10.1177/146879410200200205>
- Freeman, L. A., & Jessup, L. M. (2004). The power and benefits of concept mapping: Measuring use, usefulness, ease of use, and satisfaction. *International Journal of Science Education*, 26(2), 151–169. <https://doi.org/10.1080/0950069032000097361>
- Friston, K. J., Lin, M., Frith, C. D., Pezzulo, G., Hobson, J. A., & Ondobaka, S. (2017). Active Inference, Curiosity and Insight. *Neural Computation*, 29(10), 2633–2683. [https://doi.org/10.1162/neco\\_a\\_00999](https://doi.org/10.1162/neco_a_00999)

- Gage, N. (1989). The Paradigm Wars and Their Aftermath A “Historical” Sketch of Research on Teaching Since 1989. In S. J. Ball (Ed.), *Educational Researcher* (pp. 140–150).  
<https://doi.org/10.3102/0013189X018007004>
- Gallagher, K. T. (1986). *The Philosophy of Knowledge* (2 edition). Fordham University Press.
- Galletta, A., & Cross, W. E. (2013). *Mastering the Semi-Structured Interview and Beyond: From Research Design to Analysis and Publication*. NYU Press.  
<https://www.jstor.org/stable/j.ctt9qgh5x>
- Galletta, A., & Cross, W. E. (2016). Mastering the Semi-Structured Interview and Beyond. In *Mastering the Semi-Structured Interview and Beyond*.  
<https://doi.org/10.18574/nyu/9780814732939.001.0001>
- Galloway, A. R. (2013). The Poverty of Philosophy: Realism and Post-Fordism. *Critical Inquiry*, 39(2), 347–366.
- Gardner, M. (1978). *Aha! Insight* (1st Printing edition). W H Freeman & Co.
- Gatarek, B. (2018). *Animals Are Us: Applying the Common Ingroup Identity Model to Humane Education*. University of Windsor.
- Gates, G. S., Wolverton, M., & Gmelch, W. H. (2007). Emerging Thought and Research on Student, Teacher, and Administrator Stress and Coping. Research on Stress and Coping in Education. In *IAP - Information Age Publishing, Inc.*
- Gideon, L. (2012). Handbook of Survey Methodology for the Social Sciences. In L. Gideon (Ed.), *Handbook of Survey Methodology for the Social Sciences*. Springer New York.  
<https://doi.org/10.1007/978-1-4614-3876-2>

- Ginns, P. (2006). Integrating information: A meta-analysis of the spatial contiguity and temporal contiguity effects. *Learning and Instruction*, 16(6), 511–525.  
<https://doi.org/10.1016/j.learninstruc.2006.10.001>
- Given, L. (2008). *The SAGE Encyclopedia of Qualitative Research Methods*. SAGE Publications, Inc. <https://doi.org/10.4135/9781412963909>
- Goldman, S. R. (1976). Reading skill and the minimum distance principle: A comparison of listening and reading comprehension. *Journal of Experimental Child Psychology*.  
[https://doi.org/10.1016/0022-0965\(76\)90095-3](https://doi.org/10.1016/0022-0965(76)90095-3)
- Gordon, F. (2018). Identifying Validity in Qualitative Research: A Literature Review. *Faculty Publications and Presentations*. [https://digitalcommons.liberty.edu/busi\\_fac\\_pubs/46](https://digitalcommons.liberty.edu/busi_fac_pubs/46)
- Grabowski, B. L., Beaudoin, M., & Koszalka, T. A. (2016). Competencies for Designers, Instructors, and Online Learners. In *The Wiley Handbook of Learning Technology*.  
<https://doi.org/10.1002/9781118736494.ch13>
- Graham, K. (1983). Introduction to Survey Sampling. In *Sage University Paper Series on Quantitative Application in the Social Sciences*. Sage Publications.
- Grant, C., & Osanloo, A. (2014). Understanding, Selecting, and Integrating a Theoretical Framework in Dissertation Research: Creating the Blueprint for Your “House.” *Administrative Issues Journal Education Practice and Research*, 4(2), 12–26.  
<https://doi.org/10.5929/2014.4.2.9>
- Gray, D. E. (2017). *Doing Research in the Business World* (First edition). SAGE Publications Ltd.
- Green, R. A. (2014). The Delphi technique in educational research. *SAGE Open*.  
<https://doi.org/10.1177/2158244014529773>

- Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a Conceptual Framework for Mixed-Method Evaluation Designs. *Educational Evaluation and Policy Analysis*, 11(3), 255–274. <https://doi.org/10.3102/01623737011003255>
- Gregory, G. H., & Kuzmich, L. (2017). Instructional Strategies That Increase Student Learning. In *Data Driven Differentiation in the Standards-Based Classroom*. <https://doi.org/10.4135/9781483332451.n7>
- Griffin, C. C., & Tulbert, B. L. (1995). THE EFFECT OF GRAPHIC ORGANIZERS ON STUDENTS' COMPREHENSION AND RECALL OF EXPOSITORY TEXT: A REVIEW OF THE RESEARCH AND IMPLICATIONS FOR PRACTICE. *Reading & Writing Quarterly*, 11(1), 73–89. <https://doi.org/10.1080/1057356950110106>
- Gringeri, C., Barusch, A., & Cambron, C. (2013). Examining foundations of qualitative research: A review of social work dissertations, 2008-2010. *Journal of Social Work Education*. <https://doi.org/10.1080/10437797.2013.812910>
- Grix, J. (2002). Introducing Students to the Generic Terminology of Social Research. *Politics*, 22(3), 175–186. <https://doi.org/10.1111/1467-9256.00173>
- Grix, J. (2004). Foundations of Research. In *The Foundations of Research*. Palgrave Macmillan.
- Groshans, Mikhailova, Post, Schlautman, & Zhang. (2019). Determining the Value of Soil Inorganic Carbon Stocks in the Contiguous United States Based on the Avoided Social Cost of Carbon Emissions. *Resources*, 8(3), 119. <https://doi.org/10.3390/resources8030119>
- Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Communication & Technology*. <https://doi.org/10.1007/BF02766777>

- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In *Handbook of qualitative research*.
- Gurlitt, J., Dummel, S., Schuster, S., & Nückles, M. (2012). Differently structured advance organizers lead to different initial schemata and learning outcomes. *Instructional Science*, 40(2), 351–369. <https://doi.org/10.1007/s11251-011-9180-7>
- Hallett, F. (2014). The dilemma of methodological idolatry in higher education research: The case of phenomenography. In J. Huisman & M. Tight (Eds.), *International Perspectives on Higher Education Research* (Vol. 10, pp. 203–225). Emerald Group Publishing Limited. [https://doi.org/10.1108/S1479-3628\(2014\)0000010016](https://doi.org/10.1108/S1479-3628(2014)0000010016)
- Hallowell, M. R., & Gambatese, J. A. (2010). Qualitative research: Application of the delphi method to CEM research. *Journal of Construction Engineering and Management*. [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0000137](https://doi.org/10.1061/(ASCE)CO.1943-7862.0000137)
- Hasler, B. S., Kersten, B., & Sweller, J. (2007). Learner control, cognitive load and instructional animation. *Applied Cognitive Psychology*, 21(6), 713–729. <https://doi.org/10.1002/acp.1345>
- Hassanabadi, H., Robotjazi, E. S., & Savoji, A. P. (2011). Cognitive consequences of segmentation and modality methods in learning from instructional animations. *Procedia - Social and Behavioral Sciences*, 30, 1481–1487. <https://doi.org/10.1016/j.sbspro.2011.10.287>
- Hatch, C. A. (1998). *The effect of varied advance organizer strategies in facilitating learner achievement of specific educational objectives*. The Pennsylvania State University.
- Hawthorne, B. S., Vella-Brodrick, D. A., & Hattie, J. (2019). Well-Being as a Cognitive Load Reducing Agent: A Review of the Literature. *Frontiers in Education*. <https://doi.org/10.3389/feduc.2019.00121>

- Heidegger, M. (2005a). *Introduction to Phenomenological Research*. Indiana University Press.  
<https://doi.org/10.2307/j.ctvt1sgpb>
- Heidegger, M. (2005b). Introduction to Phenomenological Research. In *Introduction to Phenomenological Research*. Indiana University Press. <https://doi.org/10.2307/j.ctvt1sgpb>
- Hertel, J. (2018). A Picture Tells 1000 Words (but Most Results Graphs Do Not): 21 Alternatives to Simple Bar and Line Graphs. In *Clinics in Sports Medicine*.  
<https://doi.org/10.1016/j.csm.2018.04.001>
- Hertz, R. (1997). *Reflexivity & voice*. Sage Publications.
- Hill, J., & Miller, K. B. (2013). *Classroom Instruction that Works with English Language Learners* (2nd editio). ASCD.
- Hong, Z. W., Chen, Y. L., & Lan, C. H. (2014). A courseware to script animated pedagogical agents in instructional material for elementary students in English education. *Computer Assisted Language Learning*. <https://doi.org/10.1080/09588221.2012.733712>
- Hora, S. C. (2009). Expert Judgment in Risk Analysis. *Non Published Research Paper*.
- Howell, K. (2013). An Introduction to the Philosophy of Methodology. In *An Introduction to the Philosophy of Methodology*. SAGE Publications Ltd.  
<https://doi.org/10.4135/9781473957633>
- Hu, M. L. M., & Wu, M. H. (2012). The effect of concept mapping on students' cognitive load. *World Transactions on Engineering and Technology Education*.
- Huberman, A., & Miles, M. (2002). *The Qualitative Researcher's Companion*. SAGE Publications, Inc. <https://doi.org/10.4135/9781412986274>
- Huifen, L., & Tsuiping, C. (2007). Reading authentic EFL text using visualization and advance organizers in a multimedia learning environment. *Language Learning and Technology*.



- Hussein, A. (2009). The use of Triangulation in Social Sciences Research: Can qualitative and quantitative methods be combined? *Journal of Comparative Social Work*, 1, 1–12.
- Imenda, S. (2014). Is There a Conceptual Difference between Theoretical and Conceptual Frameworks? *Journal of Social Sciences*, 38(2), 185–195.  
<https://doi.org/10.1080/09718923.2014.11893249>
- Issa, N., Mayer, R. E., Schuller, M., Wang, E., Shapiro, M. B., & Darosa, D. A. (2013). Teaching for understanding in medical classrooms using multimedia design principles. *Medical Education*. <https://doi.org/10.1111/medu.12127>
- Issa, N., Schuller, M., Santacaterina, S., Shapiro, M., Wang, E., Mayer, R. E., & Darosa, D. A. (2011). Applying multimedia design principles enhances learning in medical education. *Medical Education*. <https://doi.org/10.1111/j.1365-2923.2011.03988.x>
- Ivie, S. D. (1998). Ausubel's Learning Theory: An Approach to Teaching Higher Order Thinking Skills. *The High School Journal*. <https://doi.org/10.2307/40364708>
- Jager, J., Putnick, D. L., & Bornstein, M. H. (2017). II. MORE THAN JUST CONVENIENT: THE SCIENTIFIC MERITS OF HOMOGENEOUS CONVENIENCE SAMPLES. *Monographs of the Society for Research in Child Development*, 82(2), 13–30.  
<https://doi.org/10.1111/mono.12296>
- Jamet, E., Gavota, M., & Quaireau, C. (2008). Attention guiding in multimedia learning. *Learning and Instruction*, 18(2), 135–145. <https://doi.org/10.1016/j.learninstruc.2007.01.011>
- Janesick, V. J. (1994). The dance of qualitative research design: Metaphor, methodolatry, and meaning. In *Handbook of qualitative research* (pp. 209–219). Sage Publications, Inc.

- Jarodzka, H., van Gog, T., Dorr, M., Scheiter, K., & Gerjets, P. (2013). Learning to see: Guiding students' attention via a Model's eye movements fosters learning. *Learning and Instruction*, 25, 62–70. <https://doi.org/10.1016/j.learninstruc.2012.11.004>
- Jarvie, I., & Zamora-Bonilla, J. (2011). *The SAGE Handbook of the Philosophy of Social Sciences*. <https://doi.org/10.4135/9781473913868>
- Jason, L. A., & David, S. G. (2016). *Handbook of Methodological Approaches to Community-Based Research: Qualitative, Quantitative, and Mixed Methods*. Oxford University Press.
- Jia, J. (2007). *The effects of concept mapping as advance organizers in instructional designs for distance learning programs*. Wayne State University.
- Johnson, B., & Christensen, L. (2019). *Educational research: Quantitative, qualitative, and mixed approaches* (Seventh ed, p. 704).
- Johnson, B., & Onwuegbuzie, A. J. (2004a). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33(7), 14–26. <https://doi.org/10.3102/0013189X033007014>
- Johnson, B., & Onwuegbuzie, A. J. (2004b). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33(7), 14–26. <https://doi.org/10.3102/0013189X033007014>
- Johnson, C. I., & Mayer, R. E. (2012). An eye movement analysis of the spatial contiguity effect in multimedia learning. *Journal of Experimental Psychology: Applied*, 18(2), 178–191. <https://doi.org/10.1037/a0026923>
- Johnson, H. C. (1980). Theoretical development of advance organizers. *International Journal of Mathematical Education in Science and Technology*. <https://doi.org/10.1080/0020739800110408>

- Jozkowski, A. C. (2017). Reason & Rigor: How Conceptual Frameworks Guide Research, 2nd Edition (2017). *Occupational Therapy In Health Care*, 31(4), 378–379. <https://doi.org/10.1080/07380577.2017.1360538>
- Kalman, M. (2019). “It Requires Interest, Time, Patience and Struggle”: Novice Researchers’ Perspectives on and Experiences of the Qualitative Research Journey. *Qualitative Research in Education*. <https://doi.org/10.17583/qre.2019.4483>
- Karolick, D. M. (2001). *The learner’s perception of their experiences in a Web -based graduate-level course* [Ph.D., University of Northern Colorado]. <http://search.proquest.com/docview/304716377/abstract/D2E9260755BD4748PQ/1>
- Kartal, G. (2010). Does language matter in multimedia learning? Personalization principle revisited. *Journal of Educational Psychology*, 102(3), 615–624. <https://doi.org/10.1037/a0019345>
- Kaushik, V., & Walsh, C. A. (2019). Pragmatism as a research paradigm and its implications for Social Work research. *Social Sciences*. <https://doi.org/10.3390/socsci8090255>
- Keeney, S., Hasson, F., & McKenna, H. (2011). The Delphi Technique in Nursing and Health Research. In *The Delphi Technique in Nursing and Health Research*. Wiley. <https://doi.org/10.1002/9781444392029>
- Kemmis, S. (2010). Research for praxis: Knowing doing. *Pedagogy, Culture and Society*. <https://doi.org/10.1080/14681360903556756>
- Kester, L., Kirschner, P. A., & Merriënboer, J. J. G. van. (2004). Information presentation and troubleshooting in electrical circuits. *International Journal of Science Education*, 26(2), 239–256. <https://doi.org/10.1080/69032000072809>

- Kester, L., Kirschner, P. A., & van Merriënboer, J. J. G. (2004). Timing of Information Presentation in Learning Statistics. *Instructional Science*, 32(3), 233–252.
- Kester, L., Kirschner, P. A., & van Merriënboer, J. J. G. (2005). The management of cognitive load during complex cognitive skill acquisition by means of computer-simulated problem solving. *The British Journal of Educational Psychology*, 75(Pt 1), 71–85. <https://doi.org/10.1348/000709904X19254>
- Kester, L., Kirschner, P. A., & van Merriënboer, J. J. G. (2006). Just-in-time information presentation: Improving learning a troubleshooting skill. *Contemporary Educational Psychology*, 31(2), 167–185. <https://doi.org/10.1016/j.cedpsych.2005.04.002>
- Kester, L., Lehnen, C., Van Gerven, P. W. M., & Kirschner, P. A. (2006). Just-in-time, schematic supportive information presentation during cognitive skill acquisition. *Computers in Human Behavior*, 22(1), 93–112. <https://doi.org/10.1016/j.chb.2005.01.008>
- Kezar, A., & Maxey, D. (2016). The Delphi technique: An untapped approach of participatory research. *International Journal of Social Research Methodology*, 19(2), 143–160. <https://doi.org/10.1080/13645579.2014.936737>
- Khankeh, H., Ranjbar, M., Khorasani-Zavareh, D., Zargham-Boroujeni, A., & Johansson, E. (2015). Challenges in conducting qualitative research in health: A conceptual paper. *Iranian Journal of Nursing and Midwifery Research*. <https://doi.org/10.4103/1735-9066.170010>
- Kiefer, P., Giannopoulos, I., Duchowski, A., & Raubal, M. (2016). *Measuring cognitive load for map tasks through pupil diameter*. Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics). [https://doi.org/10.1007/978-3-319-45738-3\\_21](https://doi.org/10.1007/978-3-319-45738-3_21)

- Kiewra, K. A., Mayer, R. E., Dubois, N. F., Christensen, M., Kim, S.-I., & Risch, N. (1996). Effects of Advance Organizers and Repeated Presentations on Students' Learning. *The Journal of Experimental Education*, 65(2), 147–159. <https://doi.org/10.1080/00220973.1997.9943789>
- Kim, S., Lombardino, L. J., Kim, S., & Lombardino, L. J. (2017). Exploring the Effects of Narration and Pictures on Learning for Students with Reading Deficits. *Clinical Archives of Communication Disorders*, 2(2), 116–127. <https://doi.org/10.21849/cacd.2017.00136>
- Kimball, M. A. (2013). Visual Design Principles: An Empirical Study of Design Lore. *Journal of Technical Writing and Communication*, 43(1), 3–41. <https://doi.org/10.2190/TW.43.1.b>
- Kirschner, P. A., Ayres, P., & Chandler, P. (2011). Contemporary cognitive load theory research: The good, the bad and the ugly. *Computers in Human Behavior*, 27(1), 99–105. <https://doi.org/10.1016/j.chb.2010.06.025>
- Kirschner, P. A., Park, B., Malone, S., & Jarodzka, H. (2016). Toward a Cognitive Theory of Multimedia Assessment (CTMMA). In *Learning, Design, and Technology*. [https://doi.org/10.1007/978-3-319-17727-4\\_53-1](https://doi.org/10.1007/978-3-319-17727-4_53-1)
- Kivunja, C., & Kuyini, A. B. (2017). Understanding and Applying Research Paradigms in Educational Contexts. *International Journal of Higher Education*, 6(5), 26–26. <https://doi.org/10.5430/ijhe.v6n5p26>
- Koning, B. B. de, Tabbers, H. K., Rikers, R. M. J. P., & Paas, F. (2007). Attention cueing as a means to enhance learning from an animation. *Applied Cognitive Psychology*, 21(6), 731–746. <https://doi.org/10.1002/acp.1346>

- Korur, F., Toker, S., & Eryılmaz, A. (2016). Effects of the Integrated Online Advance Organizer Teaching Materials on Students' Science Achievement and Attitude. *Journal of Science Education and Technology*, 25(4), 628–640. <https://doi.org/10.1007/s10956-016-9618-4>
- Kothari, C. R., & Garg, G. (2019). *Research Methodology: Methods and Techniques* (4th Editio). New Age International Publishers.
- Kriz, S., & Hegarty, M. (2007). Top-down and bottom-up influences on learning from animations. *International Journal of Human-Computer Studies*, 65(11), 911–930. <https://doi.org/10.1016/j.ijhcs.2007.06.005>
- Kuhn, T. S. (1996). The structure of scientific revolutions. *The University of Chicago Press*.
- Kuhn, T. S., & Hawkins, D. (1963). The Structure of Scientific Revolutions. *American Journal of Physics*, 31(7), 554–555. <https://doi.org/10.1119/1.1969660>
- Kuzel, A. (1999a). Sampling in Qualitative Inquiry. In *Doing qualitative research*.
- Kuzel, A. (1999b). Sampling in Qualitative Inquiry. In *Doing qualitative research*.
- L'Abate, L. (2012). Paradigms in Theory Construction. In L. L'Abate (Ed.), *Paradigms in Theory Construction*. Springer New York. <https://doi.org/10.1007/978-1-4614-0914-4>
- Lather, P. (2004). This is Your Father's Paradigm: Government Intrusion and the Case of Qualitative Research in Education. *Qualitative Inquiry*, 10(1), 15–34. <https://doi.org/10.1177/1077800403256154>
- Lather, P. (2018). Research as praxis. In *(Post)Critical Methodologies: The Science Possible After the Critiques* (pp. 13–32). Routledge. <https://doi.org/10.4324/9781315619538-3>
- Lawton, J. T., & Wanska, S. K. (1979). The Effects of Different Types of Advance Organizers on Classification Learning. *American Educational Research Journal*, 16(3), 223–239. <https://doi.org/10.3102/00028312016003223>

- Leach, A. (2012). *The Impact of Multimedia and Redundancy on the Efficiency of History Presentations*. 100–100.
- Leavy, P. (2017a). *Research Design Quantitative, Qualitative, Mixed Methods, Arts-Based, and Community-Based Participatory Research Approaches* (1 edition, Ed.). The Guilford Press.
- Leavy, P. (2017b). *Research Design Quantitative, Qualitative, Mixed Methods, Arts-Based, and Community-Based Participatory Research Approaches* (1 edition, Ed.; p. 301). The Guilford Press.
- LeeSing, A. C., & Miles, C. A. (1999). The Relative Effectiveness of Audio, Video, and Static Visual Computer-Mediated Presentations. *Canadian Journal of Education / Revue Canadienne de l'éducation*, 24(2), 212. <https://doi.org/10.2307/1585929>
- Lester, F. K. (2005). On the theoretical, conceptual, and philosophical foundations for research in mathematics education. *Zentralblatt Für Didaktik Der Mathematik*, 37(6), 457–467. <https://doi.org/10.1007/BF02655854>
- Lewis-Beck, M., Bryman, A., & Futing Liao, T. (2004). *The SAGE Encyclopedia of Social Science Research Methods*. Sage Publications, Inc. <https://doi.org/10.4135/9781412950589>
- Li, J., & Zhu, X. (2019). *Conceptualizing and Contextualizing Higher Education with Chinese Characteristics: Ontological and Epistemological Dimensions* (1st ed). Springer Singapore.
- Li, Y. W., Mai, N., & Tse-Kian, N. (2013). *Using mayer's design principles in online learning modules: Implementation in a student centered learning environment*. Proceedings - 2013 International Conference on Informatics and Creative Multimedia, ICICM 2013. <https://doi.org/10.1109/ICICM.2013.57>

- Lidwell, W., Holden, K., & Butler, J. (2010). Universal Principles of Design: 125 ways to enhance usability, influence perception, increase appeal, make beter design decisions, and teach through design. In *Universal principles of design: 125 ways to enhance usability, influence perception, increase appeal, make beter design decisions, and teach through design*. <https://doi.org/10.1007/s11423-007-9036-7>
- Lincoln, Y. S. (2010). “What a Long, Strange Trip It’s Been...”: Twenty-Five Years of Qualitative and New Paradigm Research. *Qualitative Inquiry*, 16(1), 3–9. <https://doi.org/10.1177/1077800409349754>
- Lingard, L. (2019). Beyond the default colon: Effective use of quotes in qualitative research. *Perspectives on Medical Education*, 8(6), 360–364. <https://doi.org/10.1007/s40037-019-00550-7>
- Linstone, H. A., & Turoff, M. (2002). *The delphi method: Techniques and applications*.
- Liu, Y., Jang, B. G., & Roy-Campbell, Z. (2018). Optimum input mode in the modality and redundancy principles for university ESL students’ multimedia learning. *Computers and Education*. <https://doi.org/10.1016/j.compedu.2018.08.025>
- Liu, Y.-H. (2006). The Effects of an Advance Organizer and Two Types of Feedback on Pre-Service Teachers’ Knowledge Application in a Blended Learning Environment. In *ProQuest Dissertations and Theses*.
- Lock, G. (2009). Some preliminary concepts of graphical analysis/composition for musicians and nonmusicians. *The Changing Face of Music and Art Education (CFMAE)*, 1, 152–173.
- Lovell-Martin, B. B. (2019). *Critical Factors Influencing Nursing Faculty Perceptions, Attitudes, and Actions in Deterring Student Academic Dishonesty* [Dissertations]. Barry University.



- Lusk, D. L., Evans, A. D., Jeffrey, T. R., Palmer, K. R., Wikstrom, C. S., & Doolittle, P. E. (2009). Multimedia learning and individual differences: Mediating the effects of working memory capacity with segmentation. *British Journal of Educational Technology*, 40(4), 636–651. <https://doi.org/10.1111/j.1467-8535.2008.00848.x>
- Maarouf, H. (2019). Pragmatism as a Supportive Paradigm for the Mixed Research Approach: Conceptualizing the Ontological, Epistemological, and Axiological Stances of Pragmatism. *International Business Research*, 12(9), 1. <https://doi.org/10.5539/ibr.v12n9p1>
- Macann, C. E. (1993). Four Phenomenological Philosophers: Husserl, Heidegger, Sartre, Merleau-Ponty. In *Philosophy*. Routledge.
- Mack, L. (2010). The Philosophical Underpinnings of Educational Research. *Polyglossia*, 19, 5–11.
- Maguire, M., & Delahunt, B. (2017). Doing a Thematic Analysis: A Practical, Step-by-Step. *The All Ireland Journal of Teaching and Learning in Higher Education*, 8(3), 3351–3351.
- Majidi, N., & Aydinlu, N. A. (2016). The Effect of Contextual Visual Aids on High School Students' Reading Comprehension. *Theory and Practice in Language Studies*, 6(9), 1827. <https://doi.org/10.17507/tpls.0609.15>
- Makombe, G. (2017). An expose of the relationship between paradigm, method and design in research. *Qualitative Report*.
- Mann, S. (2016). *The Research Interview: Reflective Practice and Reflexivity in Research Processes*. Palgrave Macmillan UK. <https://doi.org/10.1057/9781137353368>

- Markey, K., Tilki, M., & Taylor, G. (2014). Reflecting on the challenges of choosing and using a grounded theory approach. *Nurse Researcher* (2014+), 22(2), 16. <http://dx.doi.org.libezproxy2.syr.edu/10.7748/nr.22.2.16.e1272>
- Markham, A. (2017, February 28). Reflexivity: Some techniques for interpretive researchers - Annette Markham | social media, methods, and ethics. *Annette Markham*. <https://annettemarkham.com/2017/02/reflexivity-for-interpretive-researchers/>
- Marzano, R. J., Pickering, D., & Pollock, J. E. (2001). Classroom instruction that works: Research-based strategies for increasing student achievement. In *Representations*.
- Mautone, P. D., & Mayer, R. E. (2001). Signaling as a cognitive guide in multimedia learning. *Journal of Educational Psychology*, 93(2), 377–389. <https://doi.org/10.1037/0022-0663.93.2.377>
- Mautone, P. D., & Mayer, R. E. (2007). Cognitive aids for guiding graph comprehension. *Journal of Educational Psychology*, 99(3), 640–652. <https://doi.org/10.1037/0022-0663.99.3.640>
- Maxwell, J. A. (2004). Reemergent Scientism, Postmodernism, and Dialogue Across Differences. *Qualitative Inquiry*, 10(1), 35–41. <https://doi.org/10.1177/1077800403259492>
- Maxwell, J. A. (2010). Using Numbers in Qualitative Research. *Qualitative Inquiry*, 16(6), 475–482. <https://doi.org/10.1177/1077800410364740>
- Mayer, R., & Chandler, P. (2001). When Learning Is Just a Click Away: Does Simple User Interaction Foster Deeper Understanding of Multimedia Messages? *Faculty of Education - Papers*, 93. <https://doi.org/10.1037/0022-0663.93.2.390>
- Mayer, R. E. (1979a). Twenty years of research on advance organizers: Assimilation theory is still the best predictor of results. *Instructional Science*, 8(2), 133–167. <https://doi.org/10.1007/BF00117008>

- Mayer, R. E. (1979b). Can Advance Organizers Influence Meaningful Learning? *Review of Educational Research*, 49(2), 371–383. <https://doi.org/10.3102/00346543049002371>
- Mayer, R. E. (2009). *Multimedia Learning* (2, Ed.; p. 320). Cambridge University Press.
- Mayer, R. E. (2010). Applying the science of learning to medical education. *Medical Education*. <https://doi.org/10.1111/j.1365-2923.2010.03624.x>
- Mayer, R. E. (2014a). Research-Based Principles for Designing Multimedia Instruction. In *Applying science of learning in education: Infusing psychological science into the curriculum* (pp. 59–70). University of New Hampshire Scholars' Repository.
- Mayer, R. E. (2014b). Research-Based Principles for Designing Multimedia Instruction. In *Applying science of learning in education: Infusing psychological science into the curriculum* (pp. 59–70). University of New Hampshire Scholars' Repository.
- Mayer, R. E. (2014c). The Cambridge handbook of multimedia learning, second edition. In *The Cambridge Handbook of Multimedia Learning, Second Edition*. <https://doi.org/10.1017/CBO9781139547369>
- Mayer, R. E. (2014d). *The Cambridge handbook of multimedia learning, second edition*. <https://doi.org/10.1017/CBO9781139547369>
- Mayer, R. E. (2017). Using multimedia for e-learning. *Journal of Computer Assisted Learning*, 33(5), 403–423. <https://doi.org/10.1111/jcal.12197>
- Mayer, R. E., & Anderson, R. B. (1992). The instructive animation: Helping students build connections between words and pictures in multimedia learning. *Journal of Educational Psychology*, 84(4), 444–452. <https://doi.org/10.1037/0022-0663.84.4.444>
- Mayer, R. E., Dow, G. T., & Mayer, S. (2003). Multimedia Learning in an Interactive Self-Explaining Environment: What Works in the Design of Agent-Based Microworlds?

- Journal of Educational Psychology*, 95(4), 806–812. <https://doi.org/10.1037/0022-0663.95.4.806>
- Mayer, R. E., Fennell, S., Farmer, L., & Campbell, J. (2004). A Personalization Effect in Multimedia Learning: Students Learn Better When Words Are in Conversational Style Rather Than Formal Style. *Journal of Educational Psychology*, 96(2), 389–395. <https://doi.org/10.1037/0022-0663.96.2.389>
- Mayer, R. E., & Fiore, L. (2014). Principles for reducing extraneous processing in multimedia learning: Coherence, signaling, redundancy, spatial contiguity, and temporal contiguity principles. In *The Cambridge handbook of multimedia learning*, 2nd ed (pp. 279–315). Cambridge University Press. <https://doi.org/10.1017/CBO9781139547369.015>
- Mayer, R. E., Heiser, J., & Lonn, S. (2001). Cognitive constraints on multimedia learning: When presenting more material results in less understanding. *Journal of Educational Psychology*, 93(1), 187–198. <https://doi.org/10.1037/0022-0663.93.1.187>
- Mayer, R. E., & Jackson, J. (2005). The Case for Coherence in Scientific Explanations: Quantitative Details Can Hurt Qualitative Understanding. *Journal of Experimental Psychology: Applied*, 11(1), 13–18. <https://doi.org/10.1037/1076-898X.11.1.13>
- Mayer, R. E., Lee, H., & Peebles, A. (2014a). Multimedia learning in a second language: A cognitive load perspective. *Applied Cognitive Psychology*, 28(5), 653–660. <https://doi.org/10.1002/acp.3050>
- Mayer, R. E., Lee, H., & Peebles, A. (2014b). Multimedia learning in a second language: A cognitive load perspective. *Applied Cognitive Psychology*, 28(5), 653–660. <https://doi.org/10.1002/acp.3050>

- Mayer, R. E., Mathias, A., & Wetzell, K. (2002). Fostering understanding of multimedia messages through pre-training: Evidence for a two-stage theory of mental model construction. *Journal of Experimental Psychology: Applied*, 8(3), 147–154. <https://doi.org/10.1037/1076-898X.8.3.147>
- Mayer, R. E., Mautone, P., & Prothero, W. (2002). Pictorial aids for learning by doing in a multimedia geology simulation game. *Journal of Educational Psychology*, 94(1), 171–185. <https://doi.org/10.1037/0022-0663.94.1.171>
- Mayer, R. E., & Pilegard, C. (2014). Principles for managing essential processing in multimedia learning: Segmenting, pre-training, and modality principles. In *The Cambridge Handbook of Multimedia Learning, Second Edition*. <https://doi.org/10.1017/CBO9781139547369.016>
- McDonald, S. M. (2012). Perception: A Concept Analysis. *International Journal of Nursing Knowledge*, 23(1), 2–9. <https://doi.org/10.1111/j.2047-3095.2011.01198.x>
- McGough, C. D. (2019). *A Mixed Methods Study on Mid-Year Engineering Students' Perceptions of Their Future Possible Careers*. Clemson University.
- McGregor, S. L. T., & Murnane, J. A. (2010). Paradigm, methodology and method: Intellectual integrity in consumer scholarship. *International Journal of Consumer Studies*, 34(4), 419–427. <https://doi.org/10.1111/j.1470-6431.2010.00883.x>
- McLaren, B. M., DeLeeuw, K. E., & Mayer, R. E. (2011a). A politeness effect in learning with web-based intelligent tutors. *International Journal of Human-Computer Studies*, 69(1), 70–79. <https://doi.org/10.1016/j.ijhcs.2010.09.001>

- McLaren, B. M., DeLeeuw, K. E., & Mayer, R. E. (2011b). Polite web-based intelligent tutors: Can they improve learning in classrooms? *Computers & Education*, 56(3), 574–584. <https://doi.org/10.1016/j.compedu.2010.09.019>
- McMahan, J. (2008). Torture in Principle and in Practice. *Public Affairs Quarterly*, 22(2), 91–108.
- McManus, T. F. (2000). Individualizing instruction in a web-based hypermedia learning environment: Nonlinearity, advance organizers, and self-regulated learners. *Journal of Interactive Learning Research*.
- Merleau-Ponty, M. (1982). Phenomenology of Perception. In *Phenomenology of Perception*. Routledge. <https://doi.org/10.4324/9780203981139>
- Merriam, S. B. (2009). Qualitative research: A guide to design and implementation. In *The JosseyBass higher and adult education series*. <https://doi.org/10.1097/NCI.0b013e3181edd9b1>
- Merriam, S. B. (2015). *Qualitative Research: A Guide to Design and Implementation* (4 edition, p. 368). John Wiley & Sons.
- Mertens, D. M. (2007). Transformative Paradigm: Mixed Methods and Social Justice. *Journal of Mixed Methods Research*. <https://doi.org/10.1177/1558689807302811>
- Mertens, D. M. (2019). *Research and Evaluation in Education and Psychology: Integrating Diversity With Quantitative, Qualitative, and Mixed Methods* (Fifth Edit). SAGE Publications, Inc.
- Mertens, D. M., Bledsoe, K. L., Sullivan, M., & Wilson, A. (2015). Utilization of Mixed Methods for Transformative Purposes. In *SAGE Handbook of Mixed Methods in Social & Behavioral Research* (pp. 193–214). SAGE Publications, Inc. <https://doi.org/10.4135/9781506335193.n8>

- Meyer, S. B., & Lunnay, B. (2013). The application of abductive and retroductive inference for the design and analysis of theory-driven sociological research. *Sociological Research Online*. <https://doi.org/10.5153/sro.2819>
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2013). *Qualitative Data Analysis: A Methods Sourcebook* (3rd Editio, p. 408). SAGE Publications.
- Mills, A., Durepos, G., & Wiebe, E. (2012). *Encyclopedia of Case Study Research*. <https://doi.org/10.4135/9781412957397>
- Mills, J., & Birks, M. (2017). Qualitative Methodology: A Practical Guide. In *Qualitative Methodology: A Practical Guide*. <https://doi.org/10.4135/9781473920163>
- Mingers, J. (2003). A classification of the philosophical assumptions of management science methods. *Journal of the Operational Research Society*. <https://doi.org/10.1057/palgrave.jors.2601436>
- Mitchell, A. (2018). A Review of Mixed Methods, Pragmatism and Abduction Techniques. *Electronic Journal of Business Research Methods*, 16(3), 103–116.
- Mkansi, M., & Acheampong, E. A. (2012). Research Philosophy Debates and Classifications: Students' Dilemma. *Electronic Journal of Business Research Methods*, 10(2), 132–140.
- Moalusi, K. (2020). Numbers conceal the intricacies in categorising qualitative research in organisational studies: What lies beneath the surface? *SA Journal of Industrial Psychology*, 46. <http://dx.doi.org.libezproxy2.syr.edu/10.4102/sajip.v46i0.1692>
- Molina, A. I., Navarro, Ó., Ortega, M., & Lacruz, M. (2018). Evaluating multimedia learning materials in primary education using eye tracking. *Computer Standards and Interfaces*. <https://doi.org/10.1016/j.csi.2018.02.004>

- Monrouxe, L. V., & Rees, C. E. (2020). When I say ... quantification in qualitative research. *Medical Education*, 54(3), 186–187. <https://doi.org/10.1111/medu.14010>
- Moon, K., & Blackman, D. (2014). A Guide to Understanding Social Science Research for Natural Scientists. *Conservation Biology*, 28(5), 1167–1177. <https://doi.org/10.1111/cobi.12326>
- Moon, K., & Blackman, D. (2017). *A guide to ontology, epistemology, and philosophical perspectives for interdisciplinary researchers*. <https://i2insights.org/2017/05/02/philosophy-for-interdisciplinarity/>
- Moore, J. P. (2013). Promoting Conceptual Understanding via Adaptive Concept Maps. In *ProQuest Dissertations and Theses*.
- Moreno, R. (2007). Optimising learning from animations by minimising cognitive load: Cognitive and affective consequences of signalling and segmentation methods. *Applied Cognitive Psychology*, 21(6), 765–781. <https://doi.org/10.1002/acp.1348>
- Moreno, R., & Mayer, R. E. (1999). Multimedia-Supported Metaphors for Meaning Making in Mathematics. *Cognition and Instruction*, 17(3), 215–248.
- Moreno, R., & Mayer, R. E. (2000a). A coherence effect in multimedia learning: The case for minimizing irrelevant sounds in the design of multimedia instructional messages. *Journal of Educational Psychology*, 92(1), 117–125. <https://doi.org/10.1037/0022-0663.92.1.117>
- Moreno, R., & Mayer, R. E. (2000b). Engaging students in active learning: The case for personalized multimedia messages. *Journal of Educational Psychology*, 92(4), 724–733. <https://doi.org/10.1037/0022-0663.92.4.724>
- Moreno, R., & Mayer, R. E. (2004). Personalized Messages That Promote Science Learning in Virtual Environments. *Journal of Educational Psychology*, 96(1), 165–173. <https://doi.org/10.1037/0022-0663.96.1.165>



- Morgan, D. (2007). Paradigms Lost and Pragmatism Regained Methodological Implications of Combining Qualitative and Quantitative Methods. *Journal of Mixed Methods Research*.  
<https://doi.org/10.1002/9780470750841.ch9>
- Morgan, D. (2014). *Integrating Qualitative and Quantitative Methods: A Pragmatic Approach*. SAGE Publications, Inc. <https://doi.org/10.4135/9781544304533>
- Morgan, D. L. (2019). *What's the connection between Triangulation, Mixed Methods and critical multiplism?* ResearchGate.  
[https://www.researchgate.net/post/Whats\\_the\\_connection\\_between\\_Triangulation\\_Mixed\\_Methods\\_and\\_critical\\_multiplism](https://www.researchgate.net/post/Whats_the_connection_between_Triangulation_Mixed_Methods_and_critical_multiplism)
- Morrell, J. E., Walker, C. R., Loughery, C., Funk, J., Ruoff, G., & Proger, B. B. (1974). Cognitive and affective effects of audio-programed electronic feedback and oral teacher feedback. *Educational Communication and Technology Journal*.  
<https://doi.org/10.1007/BF02768565>
- Morse, J. (1991). *Qualitative Nursing Research: A Contemporary Dialogue*. SAGE Publications, Inc. <https://doi.org/10.4135/9781483349015>
- Mortari, L. (2015). Reflectivity in Research Practice: An Overview of Different Perspectives. *International Journal of Qualitative Methods*, 14(5), 1609406915618045.  
<https://doi.org/10.1177/1609406915618045>
- Moustakas, C. (1994a). Phenomenological research methods. In *Phenomenological research methods*. SAGE Publications, Inc. <https://doi.org/10.4135/9781412995658>
- Moustakas, C. (1994b). *Phenomenological research methods*. SAGE Publications, Inc. <https://doi.org/10.4135/9781412995658>

- Muijs, D. (2010). *Doing Quantitative Research in Education with SPSS* (2nd edition). SAGE Publications Ltd.
- Müller-Staub, M. (2012). The importance of clear methods descriptions in research papers. *Acta Paulista de Enfermagem*, 25(spe2), iii–iv. <https://doi.org/10.1590/S0103-21002012000900001>
- Munzner, T. (2014). *Visualization Analysis and Design* (1st edition). A K Peters/CRC Press.
- Murphy, Black, Lamping, McKee, Sanderson, Askham, & Marteau. (1998). Consensus development methods, and their use in clinical guideline development. *Health Technology Assessment*, 2(3). <https://doi.org/10.3310/hta2030>
- Murray, S. (2013). *Interactive Data Visualization for the Web: An Introduction to Designing with D3* (1st edition). O'Reilly Media.
- Nagmoti, J. M. (2017). Departing from PowerPoint default mode: Applying Mayer's multimedia principles for enhanced learning of parasitology. *Indian Journal of Medical Microbiology*. [https://doi.org/10.4103/ijmm.IJMM\\_16\\_251](https://doi.org/10.4103/ijmm.IJMM_16_251)
- Naumann, J., Richter, T., Flender, J., Christmann, U., & Groeben, N. (2007). Signaling in expository hypertexts compensates for deficits in reading skill. *Journal of Educational Psychology*, 99(4), 791–807. <https://doi.org/10.1037/0022-0663.99.4.791>
- Neuman, W. L. (2011). *Basics of Social Research: Qualitative and Quantitative Approaches* (3rd edition). Pearson.
- Ng, H. W., & Winkler, S. (2014). A data-driven approach to cleaning large face datasets. *2014 IEEE International Conference on Image Processing, ICIP 2014*. <https://doi.org/10.1109/ICIP.2014.7025068>

- Ngulube, P., Mathipa, E. R., & Gumbo, M. T. (2015). Theoretical and Conceptual Frameworks in the Social and Management Sciences. *Addressing Research Challenges: Making Headway in Developing Researchers*. <https://doi.org/10.13140/RG.2.1.3210.7680>
- Nichols, T. M. (2017). *The death of expertise: The campaign against established knowledge and why it matters*. Oxford University Press.
- Nishishiba, M., Jones, M., & Kraner, M. (2014). *Research Methods and Statistics for Public and Nonprofit Administrators: A Practical Guide*. SAGE Publications, Inc. <https://doi.org/10.4135/9781544307763>
- Norton, L. (1999). The philosophical bases of grounded theory and their implications for research practice. *Nurse Researcher*, 7(1), 31–43. <https://doi.org/10.7748/nr1999.10.7.1.31.c6102>
- Nowina-Krowicki, M., Walsh, J., Chung, J., & Thomas, B. H. (2019). *Provenance narratives and visualisation to support understanding and trust*. 7.
- Nuccetelli, S., & Seay, G. (2012). *Ethical Naturalism: Current Debates*. Cambridge University Press.
- O’Cathain, A., Murphy, E., & Nicholl, J. (2007). Why, and how, mixed methods research is undertaken in health services research in England: A mixed methods study. *BMC Health Services Research*. <https://doi.org/10.1186/1472-6963-7-85>
- Okoli, C., & Pawlowski, S. D. (2004). The Delphi method as a research tool: An example, design considerations and applications. *Information & Management*, 42(1), 15–29. <https://doi.org/10.1016/j.im.2003.11.002>
- Olivier, J. (2019). Short Instructional Videos as Multimodal Open Educational Resources in a Language Classroom. *Educational Multimedia and Hypermedia*, 28(4), 381–409.

- Olsen, W. (2012). Data Collection: Key Debates and Methods in Social Research. In *Data Collection: Key Debates and Methods in Social Research*. SAGE Publications Ltd. <https://doi.org/10.4135/9781473914230>
- Onghena, P., Maes, B., & Heyvaert, M. (2019). Mixed Methods Single Case Research: State of the Art and Future Directions. *Journal of Mixed Methods Research*, 13(4), 461–480. <https://doi.org/10.1177/1558689818789530>
- Owen, I. R. (2015). Phenomenology in action in psychotherapy: On pure psychology and its applications in psychotherapy and mental health care. In *Springer International Publishing*. Springer.
- Ozaki, H. (2000). *The effects of advance organizers on the listening comprehension of Japanese college students learning English as a foreign language*. The Ohio State University.
- Ozcelik, E., Arslan-Ari, I., & Cagiltay, K. (2010). Why does signaling enhance multimedia learning? Evidence from eye movements. *Computers in Human Behavior*, 26(1), 110–117. <https://doi.org/10.1016/j.chb.2009.09.001>
- Palagolla, N. (2016). Exploring the Linkage between Philosophical Assumptions and Methodological Adaptations in HRM Research. *Journal of Strategic Human Resource Management*, 5(1).
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533–544. <https://doi.org/10.1007/s10488-013-0528-y>
- Pappas, C. (2014). *Instructional Design Models and Theories: Subsumption Theory*. ELearning Industry. <https://elearningindustry.com/subsumption-theory>

- Park, B., Moreno, R., Seufert, T., & Brünken, R. (2011). Does cognitive load moderate the seductive details effect? A multimedia study. *Computers in Human Behavior*, 27(1), 5–10. <https://doi.org/10.1016/j.chb.2010.05.006>
- Park, S. (2015). The effects of social cue principles on cognitive load, situational interest, motivation, and achievement in pedagogical agent multimedia learning. *Educational Technology and Society*.
- Pascal, C., & Bertram, T. (2012). Praxis, ethics and power: Developing praxeology as a participatory paradigm for early childhood research. *European Early Childhood Education Research Journal*. <https://doi.org/10.1080/1350293X.2012.737236>
- Passey, D. (2020). Theories, theoretical and conceptual frameworks, models and constructs: Limiting research outcomes through misconceptions and misunderstandings. *Studies in Technology Enhanced Learning*. <https://doi.org/10.21428/8c225f6e.56810a1a>
- Patton, M. Q. (2014). *Qualitative Research & Evaluation Methods: Integrating Theory and Practice* (Fourth edi). SAGE Publications, Inc.
- Paul, R. W. (1985). Bloom's Taxonomy and Critical Thinking Instruction. *Educational Leadership*.
- Peers, I. (2006). Statistical Analysis for Education and Psychology Researchers. In *Statistical Analysis for Education and Psychology Researchers*. Routledge. <https://doi.org/10.4324/9780203985984>
- Perneger, T. V., & Hudelson, P. M. (2004). Writing a research article: Advice to beginners. *International Journal for Quality in Health Care*, 16(3), 191–192. <https://doi.org/10.1093/intqhc/mzh053>
- Peters, M. (2018). *Encyclopedia of Educational Philosophy and Theory*.

- Phillips, D. C. (2014). Encyclopedia of Educational Theory and Philosophy. In *Encyclopedia of Educational Theory and Philosophy*. <https://doi.org/10.4135/9781483346229>
- Pietkiewicz, I., & Smith, J. A. (2014). A practical guide to using Interpretative Phenomenological Analysis in qualitative research psychology. *Czasopismo Psychologiczne Psychological Journal*, 20(1). <https://doi.org/10.14691/CPPJ.20.1.7>
- Pitcher, R. (2011). Doctoral Students' Conceptions of Research. *The Qualitative Report*, 16(4), 971–983.
- Plano Clark, V., & Ivankova, N. V. (2018). Mixed Methods Research: A Guide to the Field. In *Mixed Methods Research: A Guide to the Field*. <https://doi.org/10.4135/9781483398341>
- Plutynski, A. (2011). Four Problems of Abduction: A Brief History. *HOPOS: The Journal of the International Society for the History of Philosophy of Science*, 1(2), 227–248. <https://doi.org/10.1086/660746>
- Pociask, F. D., & Morrison, G. R. (2008). Controlling Split Attention and Redundancy in Physical Therapy Instruction. *Educational Technology Research and Development*, 56(4), 379–399.
- Point, S., Fendt, J., & Jonsen, K. (2017). Qualitative Inquiry in Management: Methodological Dilemmas and Concerns in Meta-Analysis. *European Management Review*. <https://doi.org/10.1111/emre.12097>
- Ponterotto, J. G., Park-Taylor, J., & Chen, E. C. (2017). Qualitative Research in Counselling and Psychotherapy: History, Methods, Ethics and Impact. In C. Willig & W. S. Rogers (Eds.), *The SAGE Handbook of Qualitative Research in Psychology* (pp. 496–517). SAGE Publications Ltd. <https://doi.org/10.4135/9781526405555.n29>

- Pralle, M. J. (2007). *Visual design in the online learning environment* [M.F.A., Iowa State University].  
<http://search.proquest.com/docview/304857919/abstract/C85F075C4BD443BEPQ/1>
- Pressman, A. (2018). *Design Thinking: A Guide to Creative Problem Solving for Everyone* (1st edition). Routledge.
- Proger, B. B., Taylor, R. G., Mann, L., Coulson, J. M., & Bayuk, R. J. (1970). Conceptual Pre-Structuring for Detailed Verbal Passages. *The Journal of Educational Research*, 64(1), 28–34. <https://doi.org/10.1080/00220671.1970.10884083>
- Ramlatchan, M. (2019). Multimedia Learning Theory and Instructional Message Design. In *Instructional Message Design: Theory, Research, and Practice: Volume 1*. Kindle Direct Publishing.
- Räsänen, K. (2008). Meaningful academic work as praxis in emergence. *Journal of Research Practice*.
- Ratner, C. (2002). Subjectivity and objectivity in qualitative methodology. *Forum Qualitative Sozialforschung*.
- Ravitch, S. M. ;, & Riggan, M. (2016). *Reason & Rigor How Conceptual Frameworks Guide Research* (Second edi). SAGE Publications, Inc.
- Rayens, M. K., & Hahn, E. J. (2000). Building Consensus Using the Policy Delphi Method. *Policy, Politics, & Nursing Practice*, 1(4), 308–315.  
<https://doi.org/10.1177/152715440000100409>
- Redifer, J. L., Bae, C. L., & DeBusk-Lane, M. (2019). Implicit Theories, Working Memory, and Cognitive Load: Impacts on Creative Thinking. *SAGE Open*.  
<https://doi.org/10.1177/2158244019835919>

- Reigeluth, C. M., & Carr-Chellman, A. A. (2009). *Instructional-Design Theories and Models, Building a Common Knowledge Base* (Vol. 3). Routledge.
- Researching higher education: International perspectives on theory, policy and practice. (2015). In J. M. Case & J. Huisman (Eds.), *Routledge*. Routledge.  
<https://doi.org/10.4324/9781315675404>
- Richard, D. (2018). *Worldviews: An Introduction to the History and Philosophy of Science* (3 Edition, Ed.). Wiley-Blackwell.
- Richter, J., Scheiter, K., & Eitel, A. (2016). Signaling text-picture relations in multimedia learning: A comprehensive meta-analysis. *Educational Research Review*, 17, 19–36.  
<https://doi.org/10.1016/j.edurev.2015.12.003>
- Ritzer, G., & Gutting, G. (1982). Paradigms and Revolutions: Applications and Appraisals of Thomas Kuhn's Philosophy of Science. *Contemporary Sociology*, 11(3), 322.  
<https://doi.org/10.2307/2067140>
- Robertson, S. I. (2016). *Problem Solving: Perspectives from Cognition and Neuroscience* (2nd edition). Psychology Press.
- Ruane, J. M. (2015). *Introducing Social Research Methods: Essentials for Getting the Edge* (1st edition). Wiley-Blackwell.
- Ruangruchira, N. (1992). *Effects of advance organizers on student achievement in general chemistry*. Oregon State University.
- Rubin, A., & Babbie, E. R. (2016). *Empowerment Series: Research Methods for Social Work* (6th Editio). Cengage Learning.
- Russell, B. (1950). *Unpopular Essays*. Simon and Schuster.



- Rust, V. D., Soumaré, A., Pescador, O., & Shibuya, M. (1999). Research Strategies in Comparative Education. *Comparative Education Review*, 43(1), 86–109.  
<https://doi.org/10.1086/447546>
- Sadler-Smith, E. (2015). Wallas' Four-Stage Model of the Creative Process: More Than Meets the Eye? *Creativity Research Journal*, 27(4), 342–352.  
<https://doi.org/10.1080/10400419.2015.1087277>
- Sanchez, C. A., & Wiley, J. (2006). An examination of the seductive details effect in terms of working memory capacity. *Memory & Cognition*, 34(2), 344–355.  
<https://doi.org/10.3758/BF03193412>
- Sandelowski, M. (1993). Rigor or rigor mortis: The problem of rigor in qualitative research revisited. *ANS. Advances in Nursing Science*, 16(2), 1–8.  
<https://doi.org/10.1097/00012272-199312000-00002>
- Sangrá, A., Raffaghelli, J. E., & Guitert-Catasús, M. (2019). Learning ecologies through a lens: Ontological, methodological and applicative issues. A systematic review of the literature. *British Journal of Educational Technology*, 50(4), 1619–1638.  
<https://doi.org/10.1111/bjet.12795>
- Saunders, M. N. K., Lewis, P., & Thornhill, A. (2019). *Research Methods For Business Students* (8 edition). Pearson.
- Schneider, Z., Whitehead, D., Faan, G. L.-W., PhD RN, & Faan, J. H., PhD RN. (2016). *Nursing and Midwifery Research: Methods and Appraisal for Evidence Based Practice*. Elsevier Health Sciences.

- Schoonenboom, J., & Johnson, B. (2017). How to Construct a Mixed Methods Research Design. *KZfSS Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, 69(S2), 107–131. <https://doi.org/10.1007/s11577-017-0454-1>
- Schwamborn, A., Thillmann, H., Opfermann, M., & Leutner, D. (2011). Cognitive load and instructionally supported learning with provided and learner-generated visualizations. *Computers in Human Behavior*, 27(1), 89–93. <https://doi.org/10.1016/j.chb.2010.05.028>
- Schwandt, T. A. (2015). *The SAGE dictionary of qualitative inquiry* (4th Editio). SAGE Publications, Inc.
- Schwepe, J., & Rummer, R. (2014). Attention, Working Memory, and Long-Term Memory in Multimedia Learning: An Integrated Perspective Based on Process Models of Working Memory. In *Educational Psychology Review*. <https://doi.org/10.1007/s10648-013-9242-2>
- Scotland, J. (2012). Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms. *English Language Teaching*, 5(9), 9–16. <https://doi.org/10.5539/elt.v5n9p9>
- Scott, D., & Usher, R. (2011). Researching Education: Data, Methods and Theory in Educational Enquiry. In *Continuum Research Methods* (2nd ed). Continuum.
- Searls, E. F. (1983). An Advance Organizer is...All or None of the Above. *A Journal of Literacy and Language Arts*, 23(4), 243–248.
- Sefotho, M. M. (2015). A Researcher's Dilemma: Philosophy in Crafting Dissertations and Theses. *Journal of Social Sciences*. <https://doi.org/10.1080/09718923.2015.11893390>
- Shah, S. R., & Al-Bargi, A. (2013). Research Paradigms: Researchers' Worldviews, Theoretical Frameworks and Study Designs. *Arab World English Journal*, 4(4), 252–264.

- Shannon-Baker, P. (2016). Making Paradigms Meaningful in Mixed Methods Research. *Journal of Mixed Methods Research*, 10(4), 319–334. <https://doi.org/10.1177/1558689815575861>
- Share, C. (2012). Mises apriorism: Tautology or theory of praxis? In *Journal of Peace, Prosperity and Freedom* (pp. 65–90).
- Shorten, A., & Smith, J. (2017). Mixed methods research: Expanding the evidence base. *Evidence Based Nursing*, 20(3), 74–75. <https://doi.org/10.1136/eb-2017-102699>
- Shoufan, A. (2019). Estimating the cognitive value of YouTube’s educational videos: A learning analytics approach. *Computers in Human Behavior*. <https://doi.org/10.1016/j.chb.2018.03.036>
- Sim, S. (2012). The Routledge Companion to Postmodernism. In *The Routledge Companion to Postmodernism, Third Edition*. Routledge. <https://doi.org/10.4324/9780203813201>
- Singh, V., & Walwyn, D. R. (2017). Influence of personal epistemology on research design: Implications for research education. *Journal of Research Practice*, 13(2), 1–19.
- Sisson, P., & Ryan, J. J. C. H. (2017). A Knowledge Concept Map: Structured Concept Analysis from Systematic Literature Review. *Journal of Entrepreneurship, Management and Innovation*. <https://doi.org/10.7341/20171332>
- Skulmoski, G. J., Hartman, F. T., & Krahn, J. (2007). The Delphi Method for Graduate Research. *Journal of Information Technology Education: Research*, 6, 001–021.
- Sobel, D. (2009). Subjectivism and Idealization. *Ethics*. <https://doi.org/10.1086/596459>
- Sorden, S. D. (2005). A cognitive approach to instructional design for multimedia learning. In *Informing Science*. <https://doi.org/10.28945/498>
- Sorinel, C., & Marian, I. (2008). Praxeology in mises’s work. *The Young Economists Journal*, 1(10), 125–131.

- Sparks, D. (2006). *Leading for Results: Transforming Teaching, Learning, and Relationships in Schools* (2nd edition). Corwin.
- Spector, J. M., & Koszalka, T. A. (2004a). *The DEEP Methodology for Assessing Learning in Complex Domains*.
- Spector, J. M., & Koszalka, T. A. (2004b). *The DEEP Methodology for Assessing Learning in Complex Domains*.
- Spector, J. M., Lockee, B. B., Smaldino, S., & Herring, M. (Eds.). (2013). *Learning, Problem Solving, and Mindtools: Essays in Honor of David H. Jonassen* (1st edition). Routledge.
- Spector, J. M., Merrill, M. D., Elen, J., & Bishop, M. J. (2014). Handbook of research on educational communications and technology: Fourth edition. In *Handbook of Research on Educational Communications and Technology: Fourth Edition*.  
<https://doi.org/10.1007/978-1-4614-3185-5>
- Spirkin, A. (1983). Themes in Soviet Marxist Philosophy. In *Dialectical Materialism* (pp. 5–47). Springer, Dordrecht. [https://doi.org/10.1007/978-94-010-1873-9\\_2](https://doi.org/10.1007/978-94-010-1873-9_2)
- Sriraman, B., & English, L. (2010). *Theories of Mathematics Education*. Springer Berlin Heidelberg. <http://link.springer.com/10.1007/978-3-642-00742-2>
- Stanley, M. (2006). A Grounded Theory of the Wellbeing of Older People. In L. Finlay & C. Ballinger (Eds.), *Qualitative Research for Allied Health Professionals: Challenging Choices* (pp. 63–78). John Wiley & Sons Ltd.
- Steiger, D. M., & Steiger, N. M. (2009). Discovering a decision maker's mental model with instance-based cognitive mining: A theoretical justification and implementation. *Interdisciplinary Journal of Information, Knowledge, and Management*.  
<https://doi.org/10.28945/61>

- Stiller, K. D., Freitag, A., Zinnbauer, P., & Freitag, C. (2009). How pacing of multimedia instructions can influence modality effects: A case of superiority of visual texts. *Australasian Journal of Educational Technology*, 25(2), Article 2. <https://doi.org/10.14742/ajet.1149>
- Story, C. M. (1998). What instructional designers need to know about advance organizers. *International Journal of Instructional Media*, 25(3), 9.
- Sung, E., & Mayer, R. E. (2012). When graphics improve liking but not learning from online lessons. *Computers in Human Behavior*. <https://doi.org/10.1016/j.chb.2012.03.026>
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*. [https://doi.org/10.1016/0364-0213\(88\)90023-7](https://doi.org/10.1016/0364-0213(88)90023-7)
- Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive Load Theory (Explorations in the Learning Sciences, Instructional Systems and Performance Technologies)*. Springer.
- Sweller, John. (1999). Instructional design in technical areas. *Australian Education Review*, 43, 168.
- Tabbers, H. K., & van der Spoel, W. (2011). Where did the Modality Principle in Multimedia Learning Go? A -Double Replication Failure that Questions Both Theory and Practical Use. *Zeitschrift Für Pädagogische Psychologie*, 25(4), 221–230. <https://doi.org/10.1024/1010-0652/a000047>
- Tang, H., Xing, W., & Pei, B. (2018). Exploring the temporal dimension of forum participation in MOOCs. *Distance Education*, 39(3), 353–372. <https://doi.org/10.1080/01587919.2018.1476841>
- Taskeen, S., Shehzadi, A., Khan, T., & Saleem, N. (2014). Difficulties faced by novice researchers: A Study of Universities in Pakistan. *International Journal of Art and Literature*.

- Teddlie, C., & Tashakkori, A. (2009). *Foundations of Mixed Methods Research: Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*. In *SAGE Publications, Inc.* SAGE Publications, Inc.
- Teddlie, C., & Tashakkori, A. (2012). Common “Core” Characteristics of Mixed Methods Research: A Review of Critical Issues and Call for Greater Convergence. *American Behavioral Scientist*. <https://doi.org/10.1177/0002764211433795>
- Tergan, S.-O., & Keller, T. (2005). *Knowledge and Information Visualization Searching for Synergies*. Springer.
- The Cambridge Handbook of Expertise and Expert Performance. (2018). In K. A. Ericsson, R. R. Hoffman, A. Kozbelt, & A. M. Williams (Eds.), *The Cambridge Handbook of Expertise and Expert Performance*. Cambridge University Press. <https://doi.org/10.1017/9781316480748>
- Thomas, D., & Hodges, I. (2010). *Designing and Managing Your Research Project: Core Skills for Social and Health Research*. SAGE Publications Ltd. <https://doi.org/10.4135/9781446289044>
- TIAN De-xin. (2018). A Hands-on Approach Towards the Application of Research Methods in Academic Paper Writing. *Journalism and Mass Communication*. <https://doi.org/10.17265/2160-6579/2018.04.003>
- Trochim, W. M., Donnelly, J. P., & Arora, K. (2015). *Research Methods: The Essential Knowledge Base* (2nd edition). Cengage Learning.
- Understanding and Validity in Qualitative Research. (1992). In *The Qualitative Researcher's Companion*. SAGE Publications, Inc. <https://doi.org/10.4135/9781412986274.n2>

- Van Bramer, J. (2003). Conversation as a Model of Instructional Interaction. *Literacy Teaching and Learning*.
- Van Der Walt, J. L., & Potgieter, F. J. (2012). Research method in education: The frame by which the picture hangs. *International Journal of Multiple Research Approaches*. <https://doi.org/10.5172/mra.2012.6.3.220>
- Van Gerven, P. W. M., Paas, F., & Tabbers, H. K. (2006). Cognitive aging and computer-based instructional design: Where do we go from here? *Educational Psychology Review*. <https://doi.org/10.1007/s10648-006-9005-4>
- Van Manen, M. (2014). Phenomenology of Practice: Meaning-Giving Methods in Phenomenological Research and Writing. In *Routledge*. Routledge.
- Vekiri, I. (2002). What is the value of graphical displays in learning? In *Educational Psychology Review*. <https://doi.org/10.1023/A:1016064429161>
- Verleye, K. (2019). Designing, writing-up and reviewing case study research: An equifinality perspective. In *Journal of Service Management*. <https://doi.org/10.1108/JOSM-08-2019-0257>
- Vogt, W. Paul. (2007). Quantitative research methods for professionals. *Quantitative Research Methods for Professionals*.
- von der Gracht, H. A. (2012). Consensus measurement in Delphi studies: Review and implications for future quality assurance. *Technological Forecasting and Social Change*, 79(8), 1525–1536. <https://doi.org/10.1016/j.techfore.2012.04.013>
- Wallas, G. (1926). *The Art of Thought*. Solis Press.
- Walliman, N. (2017). *Research Methods: The Basics* (2 edition). Routledge.

- Walshe, C. E. (2018). Mixed Method Research in Palliative Care. In R. D. MacLeod & L. van den Block (Eds.), *Textbook of Palliative Care*. Springer. [https://doi.org/10.1007/978-3-319-31738-0\\_109-1](https://doi.org/10.1007/978-3-319-31738-0_109-1)
- Wang, N., Johnson, W. L., Mayer, R. E., Rizzo, P., Shaw, E., & Collins, H. (2008). The politeness effect: Pedagogical agents and learning outcomes. *International Journal of Human-Computer Studies*, 66(2), 98–112. <https://doi.org/10.1016/j.ijhcs.2007.09.003>
- Weaver, K., & Olson, J. K. (2006). Understanding paradigms used for nursing research. *Journal of Advanced Nursing*, 53(4), 459–469. <https://doi.org/10.1111/j.1365-2648.2006.03740.x>
- Weinberg, J. R. (2013). An examination of logical positivism. In *An Examination of Logical Positivism*. <https://doi.org/10.4324/9781315823867>
- Whitlow-Spurlock, B. (2019). *A Grounded Theory Study of the Educational Processes Implemented by Parents Homeschooling Gifted or Twice-Exceptional Children*. Liberty University.
- Whittemore, R., Chase, S. K., & Mandle, C. L. (2001). Validity in Qualitative Research. *Qualitative Health Research*, 11(4), 522–537. <https://doi.org/10.1177/104973201129119299>
- Wilkinson, D. (2005). *The Essential Guide to Postgraduate Study*. SAGE Publications Ltd.
- Williams, C. (2011). Research Methods. *Journal of Business & Economics Research (JBER)*, 5(3). <https://doi.org/10.19030/jber.v5i3.2532>
- Williams, M. (2005). *Philosophical Foundations of Social Research Methods* (1 edition). SAGE Publications Ltd.
- Williams, M., & May, T. (1996). *Introduction to the philosophy of social research*. <https://doi.org/10.4324/9780203500064>



- Williams, N. (2018). *How to use multimedia learning principles to create great digital learning*. Logicearth Learning Services. <https://blog.logicearth.com/how-to-use-multimedia-learning-principles-to-create-great-digital-learning>
- Willis, J. (2007). Foundations of Qualitative Research: Interpretive and Critical Approaches. In *Routledge Companions* (3 edition). SAGE Publications, Inc. <https://doi.org/10.4135/9781452230108>
- Wong, K. M., Musa, G., & Wong, E. S. K. (2011). A review of philosophical assumptions in management research. *African Journal of Business Management*, 5(29), 11546–11550. <https://doi.org/10.5897/AJBM11.1387>
- Zimmerman, H. G. (2019). *Transitioning and Thriving: Cross-Cultural Pathways of Resilience in Deaf Youth*. Gallaudet University.
- Žukauskas, P., Vveinhardt, J., & Andriukaitienė, R. (2018). Philosophy and Paradigm of Scientific Research. *Management Culture and Corporate Social Responsibility*. <https://doi.org/10.5772/intechopen.70628>

## VITA

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