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Systematic curriculum and instructional development for a mixed methods DACUM research: SCID MMR-DACUM

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Abstract. The aim of this study is to present a learning package based on SCID (Systematic Curriculum and Instructional Development) that provides the necessary knowledge, attitudinal information and practice opportunities on how to use Developing A Curriculum (DACUM) in Mixed Methods Research (MMR) in the study of occupational analysis. The study provides a learning package to guide mixed methods research for those wishing to carry out DACUM-based occupational analysis. In this learning package, researchers will achieve three enabling objectives for MMR-DACUM studies: (1) practice in writing the methodology of the data, (2) practice in analyzing the data, and (3) practice in discussing and concluding their findings. To enable researchers to achieve these three enabling objectives, an information sheet with examples from one of the author's studies, self-checking model questions and answers, practice exercises, a final performance test, and standards are introduced.

Keywords: Systematic curriculum and instructional development, mixed methods research, DACUM, coast guard

1. Introduction

A mixed methods research design draws on the strengths of both quantitative and qualitative approaches to provide a more comprehensive understanding of a research question (Creswell, 2014). Mixed methods research is not simply the use of quantitative and qualitative data, but the thoughtful integration of these approaches to achieve a synergistic effect where the whole is greater than the sum of its parts (Hafsa, 2019). This integration can take various forms, from using qualitative data to develop quantitative tools, to using quantitative data to contextualize qualitative findings. The 'why' behind the choice of a mixed methods approach is as important as the 'how'. Identifying the specific research questions to be addressed by each method and how different methods of inquiry can be integrated is key to a successful mixed methods study (Nathogapan, 2021). This design has become increasingly popular in recent years because it allows researchers to understand both the tendencies of participants in a community and their individual experiences (Dawadi et al., 2021). Thus, it provides researchers with more flexibility and depth when addressing complex problems. This study will provide the reader with the general knowledge and skills required to conduct single case study research utilizing a mixed design, in which two mixed design types (exploratory sequential mixed design and multiple sequential mixed designs) are employed in conjunction (Toyon, 2021).

1.1. Performance objective

Given qualitative and quantitative data, write a Mixed Methods DACUM Research (MMR-DACUM) manuscript. The finished job must meet all criteria on Performance Tests 5 and 5.1.

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1.2. Enabling objectives

1. Practice writing the methodology of MMR-DACUM data.
2. Practice analyzing MMR-DACUM data.
3. Practice discussing and concluding the results of MMR-DACUM data.

1.3. Prerequisites

- Master / PhD degree in the related field.
- Hold DACUM facilitator certificate.
- Knowledge of using Information and Communication Technology (ICT) (MS Office Word, Excel, etc.), using Data Analysis Software (quantitative and qualitative NVIVO, SPSS, etc), analytical thinking, and critical thinking.
- Knowledge of the philosophy of social sciences.

2. Writing Methodology of MMR-DACUM Data

As seen in Table 1: Learning Experience #1, you should follow the steps of learning activities by taking care of special instructions in the practice writing methodology of MMR-DACUM data.

Table 1.

Learning experience #1

Enabling Objective #1: Practice writing methodology of MMR-DACUM data	
Learning Activities	**Special Instructions**
Read the Information Sheet titled 'Practice writing methodology of MMR-DACUM data' on 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11	
Watch the qualitative data analysis video, read quantitative data analysis tutorials and identify the important messages to convey about your university when writing methodology of MMR-DACUM data manuscript.	• https://www.qsrinternational.com/nvivo/nvivo-12-tuto- rial-windows/00-let-s-get-started • https://www.ibm.com/cloud/garage/dte/tutorial/advanced-analytics-ibm-spss-statistics • https://www.spss-tutorials.com/
Discuss with the mentor expert in writing methodology of MMR-DCUM data at your faculty the methods he/she uses to develop an MMR-DACUM manuscript. What would you have to do differently?	Ask your mentor to suggest a co-researcher who can observe and help you with your practice sessions and the Practice Checklist.
Demonstrate your knowledge of writing methodology of MMR-DACUM by completing the Self-Check on 2.12	
Check your answers against the Self-Check Model Answers on 2.13.	
Practice writing methodology of MMR-DACUM data while the academic staff expert in DACUM observes and offers help as needed. Ask the academic staff expert in MMR-DACUM to use the checklist titled "Practice Writing the Methodology of MMR-DACUM Data" on 2.14 to assess your progress.	

2.1. Determining the title of the manuscript

You should decide on the correct and comprehensive title for the research by taking care of your study aim so that the title reflects the whole manuscript and makes sense.

For example, if you do an MMR-DACUM to understand and determine the occupational analysis of the Coast Guard officers regarding the duties they perform in their profession and to analyze their views on the level of accomplishment of their duties in line with the issues identified in this analysis the title of your manuscript can be written as,

> DACUM Analysis of The Coast Guard Officers and Their Views on The Level of Accomplishment of Their Duties: Multi-Stage Mixed Method Research.

2.2. Writing the abstract and keywords

You should decide what and how many words of abstract and keywords to use to reflect the entire research (aim, methodology, findings, and implications) based on the database searching engine in the research topic you choose so that the abstract and keywords should reflect the whole manuscript and make sense.

For example, for the abstract and keywords of the MMR-DACUM called 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` to understand and determine the occupational analysis of the Coast Guard officers regarding the duties they perform in their profession and to analyze their views on the level of accomplishment of their duties in line with the issues identified in this analysis can be as following:

> Occupational analysis consists of collecting and recording valid information about a particular profession and the skills required from the practitioner of that profession. In the analysis, in addition to the activities and responsibilities that make up the profession, the knowledge, skills, and abilities needed for effective performance and the standards or goals that form the basis for evaluating performance are revealed. In this study, the occupational analysis of the officers who are the managers of the Coast Guard was carried out by the DACUM occupational analysis method. In the study, the level of realization of the results obtained by the analysis was also determined. In the study, quantitative and qualitative methods are integrated in a mixed-method approach. Thanks to this, a more thorough understanding of the research problem and more satisfactory answers to all questions were provided. This study is a Multi-Stage Mixed Method research. DACUM occupational analysis application, which is also a case study, was carried out in four different groups with 24 Coast Guard officers, each of whom served in different regions (Black Sea, Sea of Marmara, Aegean Sea, and Mediterranean Sea). The officers identified 10 duties and 119 tasks in the DACUM analysis. The analysis also revealed the information, skills, tools, behaviours, threats, opportunities, and abbreviations that officers should have. In the light of the data obtained, the Occupational Analysis Scale was developed and applied to 217 officers and the level of realization of the issues determined in the DACUM occupational analysis was determined. The Occupational Analysis Scale was developed with the data obtained from the DACUM and the scale was applied to 217 officers and the level of realization of the issues determined in the DACUM occupational analysis was determined. In the analysis of the data obtained from the scale, it was found that the level of realization of the officers' duties was very high and at a high level in all the tasks. This situation has shown that DACUM is an effective analysis method. The issues identified with DACUM were also compared with the semi-structured focus group interview in which The Coast Guard officers participated and document analysis. With the study, it was once again seen that DACUM is a well-organized method for analysing duties and competencies associated with a specific employment position or profession description. The findings from DACUM can enable the Coast Guard to review and revise its core personnel recruitment and training policies and strategies. The Coast Guard can benefit from the data obtained from this study at three levels: individual, organizational, and strategic.
>
> Keywords: Occupation Analysis, DACUM, Coast Guard, Knowledge, Skills, Behavior, Mixed Methods Research

2.3. Reviewing the literature

According to Gunbayi and Sorm (2018), the selection of philosophies and paradigms should be informed by the individual researcher's cognitive interests, which may encompass technical, practical, and emancipatory interests. This process of selection involves determining which reference books, articles, and dissertations to review, as well as the most appropriate scientific search engines to utilize. The chosen paradigm will significantly influence the decisions made throughout the research process. A comprehensive review of related research fields is therefore essential, both to contribute to the research

field and to support the research aim and research questions. This will enable readers to understand why the research is being conducted and what contribution it will make to the research field.

> This standpoint, which posits the notion that qualitative and quantitative approaches are complementary, facilitates the attainment of diverse perspectives on what is significant and what is valuable, whilst ensuring that the inquiry process is as inclusive as possible. The utilization of a mixed method approach affords numerous advantages, including (1) a wide range of applicability, (2) the integration of both qualitative and quantitative approaches under a unified framework, and (3) the facilitation of meaningful integration of both methods (Günbayı & Karadağ, 2022). The preference for mixed methods among researchers can be attributed to a desire to eliminate uncertainties associated with quantitative and qualitative methods, address concerns regarding validity and reliability, and address research problems more comprehensively (Creswell & Plano Clark, 2011; Teddlie & Tashakkori, 2009).

2.4. Explaining the research aim and writing research questions

You should decide what and how many research questions, both quantitative and qualitative strands of your MMR-DACUM, to write to reach the aim of the research by reviewing the literature related to the research topic so that the data you collect and your findings should answer the research questions and keep you up with the research aim.

For example, the research aim and the research questions of the MMR-DACUM study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` is as following:

> This study aims to conduct a job analysis of the tasks performed by Coast Guard officers in their profession and to analyze their views regarding the level of fulfilment of these tasks in line with the issues identified in this analysis. By this aim, the study seeks to answer the qualitative research question, "What is the DACUM analysis related to the profession of coast guard officers, and what are their views on the level of task fulfilment?" as well as the quantitative research question, "What is the level of task fulfilment of coast guard officers about their profession?" To achieve this, a single mixed method type of multistage mixed method design, combining two different designs (Exploratory Sequential Design and Explanatory Sequential Design), was employed.
>
> The sub-problems of the research were determined separately for the qualitative and quantitative parts as follows:
>
> ***I. Qualitative Part Sub Problems***
>
> 1. What are the duties of Coast Guard officers?
>
> 2. What are the duties performed by the officers within the scope of their specified duties?
>
> 3. What are the knowledge and skills that officers should possess?
>
> 4. What are the tools, equipment, and materials used by officers?
>
> 5. What are the expected behaviors of officers?
>
> 6. What are the officers' future tendencies (threats and opportunities) about the officer profession?
>
> 7. What are the abbreviations used by officers during the performance of their duties?
>
> ***II. Quantitative Part Sub-Problems***
>
> 1. What is the level of realization of the duties of officers within the framework of DACUM occupational analysis?
>
> 2. What is the level of realization of officers' duties according to regions within the framework of DACUM occupational analysis?
>
> 3. Within the framework of DACUM occupational analysis, is there a relationship between the distribution of officers' tasks?
>
> 4. Within the framework of DACUM occupational analysis, what is the level of realization of the jobs under the tasks?
>
> 5. Within the framework of DACUM occupational analysis, what is the level of distribution of the knowledge required for officers?

6. What is the level of distribution of the skills required to be possessed by officers within the framework of DACUM occupational analysis?

7. What is the level of use of the tools, equipment, and materials used by the officers within the framework of DACUM occupational analysis?

8. What is the distribution level of the expected behaviours of officers within the framework of DACUM occupational analysis?

2.5. Explaining which MMR-DACUM design chosen

You should decide which MMR-DACUM design (the convergent parallel design: the parallel-data bases variant, the data-transformation variant, the data-validation variant; the explanatory sequential design: follow-up explanations model, participant selection model; the exploratory sequential design: instrument-development variant, theory-development variant; the embedded design: embedded experimental model, embedded correlational model, embedded instrument development and validation variant; the multiphase design: large-scale program, development and evaluation projects, multilevel statewide studies, single mixed methods studies that combine both concurrent and sequential phases; the transformative design: the feminist lens transformative variant, the disability lens transformative variant, the socioeconomic class lens transformative variant; action study: technical action study, participatory action study, emancipatory action study (Creswell & Plano Clark, 2017; Gunbayi & Sorm, 2018)) to choose and why based on experience and reference book suggestions of quantitative and qualitative research methods so that the design you choose should comply with your research aim, otherwise you may mislead readers to do study.

For example, the explanation of why MMR-DACUM design was chosen in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` is as follows:

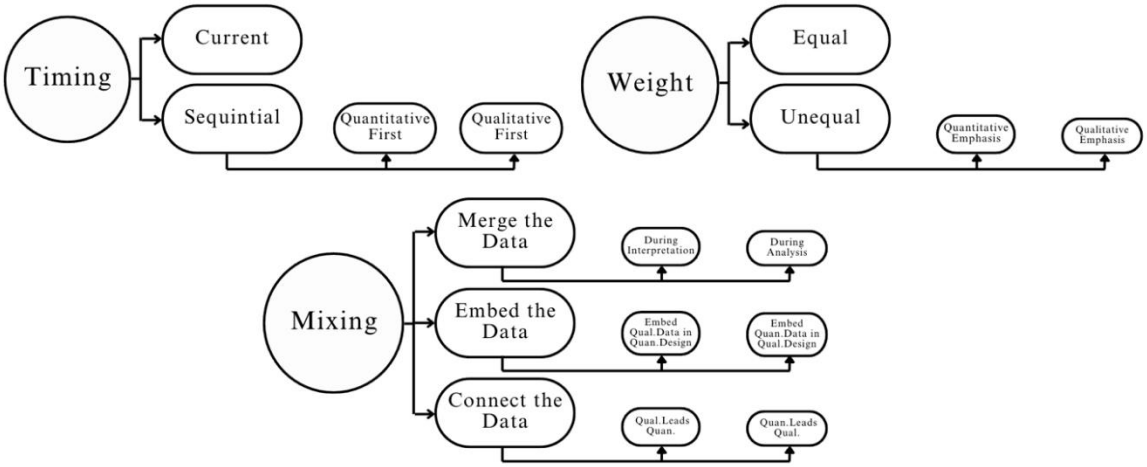
> Research design, which encompasses the stages of data collection, processing, and interpretation, provides information about the general structure of a study or the plan of a study (Scott & Morrison, 2007; Wiersma & Jurs, 2004).In this study, a mixed method approach was adopted, integrating quantitative and qualitative methods to comprehensively understand the research problem and obtain satisfactory answers to all questions. The underlying assumption is that a single data source (DACUM) will not suffice to address the research problem and that the qualitative data obtained should be supported by quantitative data. Mixed method research offers the advantage of compensating for the validity and reliability problems arising from both qualitative and quantitative research.
>
> Clark and Ivankova (2017) posit that the level of interaction, prioritization, timing, and the decision of how and where to combine quantitative and qualitative data play an active role in design selection. This research is based on these considerations. Given that quantitative data were collected from qualitative data in the first stage and qualitative data were collected from quantitative data in the second stage, it was decided to combine interactive, qualitative priority, sequential timing, and quantitative and qualitative data during interpretation. In line with this decision, it was evaluated that it would be appropriate to use a single mixed method type of multi-stage mixed design from mixed method research.

2.6. Deciding in which order the MMR-DACUM data will be analyzed

Following the selection of the MMR-DACUM design, you need to decide on how to analyze the MMR data, either separately or combined. Your decision should take into account interaction, timing, prioritization, and the mix of qualitative and quantitative data following the selected designs or variants of mixed types, as shown in Figure 1.

Figure 1. Decision diagram for mixed methods design criteria for timing, weighting, and mixing. **Source:** Adapted from Creswell & Plano Clark (2017); Gunbayı (2022).

For example, deciding in which order the MMR-DACUM data will be analyzed in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-



stage mixed method research (Duzguncinar, 2023)` is as shown in Figure2:

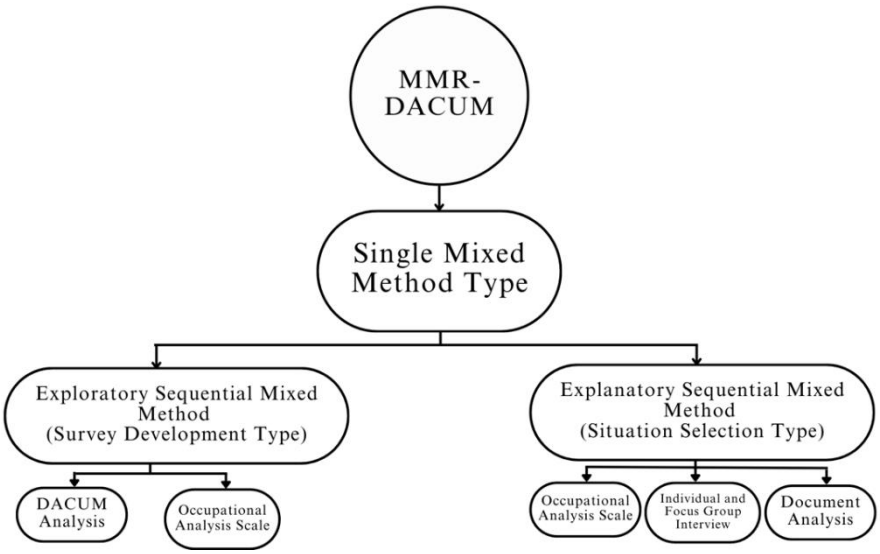


Figure 2. Sample decision order diagram MMR-DACUM
Source: Adapted from Duzguncinar (2023).

2.7. Explaining sampling methods and techniques

It is essential to determine the most appropriate sampling methods and techniques for the specific nature of the research. For quantitative research, the utilization of random sampling methods is imperative, whereas, for qualitative research, purposive sampling techniques should be employed. In making this decision, it is crucial to draw upon one's experiential knowledge and to consult reference materials that provide recommended sampling strategies. This approach ensures that the data collected through sampling is both relevant and reliable, aligning with the research objective and providing a reliable foundation for analysis.

For example, the sampling methods and techniques chosen for the study 'DACUM analysis of the coast Guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` are as follows:

> The population of the study consists of officers of the ranks of Lieutenant, Lieutenant Commander, and Commander serving in the floating elements of the Coast Guard. According to the data received from the Coast Guard, the number of these officers is N=219. The officers are the decision-making managers of the Coast Guard and they command both the personnel under their command and the floating elements, also called Coast Guard boats, in order to fulfil the tasks assigned to the floating elements. In the qualitative phases of the study (DACUM job analysis and focus group interview), the purposive sampling method was preferred. In this method, people who meet certain criteria are included in the study according to the purpose of the research (Given, 2008). Purposive sampling methods are used to discover and explain phenomena and events (Yıldırım & Şimşek, 2005). The actions carried out in the first phase of the research, in which the exploratory sequential design was applied, were listed as obtaining and evaluating the qualitative data and then creating the Occupational Analysis Scale (OAS). In the explanatory sequential design phase, as indicated by Creswell and Clark (2018), it was ensured that the participants in the qualitative phase were those who had initially participated in the quantitative data collection phase (OAS). It was established as a criterion that the officers selected (or assigned) to participate in both the DACUM group study and the focus group interview should have served on the Coast Guard's floating elements, in other words, in accordance with the DACUM methodology, they should be the individuals who personally performed the task.

2.8. Explaining data collection methods and techniques

It is essential to provide a detailed rationale for the selection of data collection methods and techniques, taking into account both quantitative and qualitative strands of research. This justification should be supported by empirical evidence and relevant reference book suggestions for quantitative and qualitative research methods. The data collected from the sampling should then be used to support the objectives of the study.

For example, an explanation of data collection methods and techniques in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` is as follows:

> The primary instrument for data collection in this study is the DACUM occupational analysis, which is conducted in four distinct regions. DACUM, a vocational-technical education curriculum development instrument, is a rapid, effective, and economical analysis method that places workers at the core and is founded on the experiences of those who perform the profession (Norton, 1985). In addition to analyzing an occupation in all its dimensions, the DACUM process reduces the gaps between legislation and the practice of that occupation. For these reasons, this structured, efficient, cost-effective, and proven approach makes the DACUM method very suitable for working on a realistic and robust occupational analysis, and the approach based on the participation of expert members of the profession from which this model draws its strength makes it a suitable method for collecting realistic data and thus achieving the objectives of this study.
>
> By the data obtained from the DACUM occupational analysis, the Occupational Analysis Scale (OAS), which also constitutes the quantitative phase of the study, was prepared. With the permission of the Coast Guard, the questionnaire was administered electronically via special communication groups between 18-30 April 2022, with a target completion time of 20 minutes. The questionnaire was structured into four sections, each corresponding to a specific aspect of the DACUM occupational analysis. The first section pertained to the region of service, the second to the tasks performed, and the third to the tasks performed under the tasks belonging to the specified tasks, (4) the knowledge, skills, tools, equipment, and materials they use, and the behaviors expected to be displayed by an officer, and (5) the threats and opportunities for the officer profession. While making this assessment, the officers chose an option between 5, which is the highest rating, and 1, which is the lowest rating. In other sections, if they agreed with each statement, they ticked the box next to it. Since all the data in the questionnaire were taken from the DACUM occupational analysis, there was no need for any pilot study or expert opinion to test the reliability and validity.

2.9. Explaining the reliability and validity of the research

You should explain what you will do to support the reliability and validity of the research by conducting a pilot study on the reliability and validity of the study to ensure high reliability and validity of the research for both quantitative and qualitative strands.

For example, the reliability and validity explanations of the research in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` are as follows:

> For the reliability of the analysis process, the themes and subcategories were controlled with the support of field experts (senior officers). For validity, the observation notes taken during the interviews were examined and analyzed, and the data obtained were evaluated in detail (Başkale, 2016). Not only what was said, but also the subtexts of the discourses were followed and in this way, a holistic analysis was carried out through emphasis, implication, and evaluation (Çakır, 2020). The texts obtained from the interviews were supported by the findings, thus ensuring the validity and reliability of the research. To contribute to the validity of the research, (1) the research process was explained in detail to the participants, (2) the findings obtained from the interviews were analyzed with the support of field experts, (3) the findings obtained were checked by senior officers with more professional experience and years of service among the officers interviewed, and (4) to obtain different perspectives, the opinions and suggestions of field experts were consulted regarding both the DACUM professional analysis and the focus group interview.

2.10. Reporting ethical process

You will follow the steps outlined in the Ethics Committee for Social Science Research form and obtain ethical approval before carrying out your research for both quantitative and qualitative strands of research.

For example, the ethical process of the research in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` are as follows:

> In this research, priority was given to research ethics throughout the data collection process. Research ethics can be defined as a set of guidelines for conducting ethical research (Ersoy, 2015). Despite the many controversies within this field and the lack of consensus among scientists, the importance of research ethics has increased in recent years (Ruacan, 2005). In research that is based on human opinions, such as the present study, there is the potential (although this was not realized in advance) to create negative situations for the participant, such as tension, stress, and anxiety. Due to this concern, research ethics were carefully followed at every stage during the preliminary preparation phase and data collection. The legal permissions required for this study were obtained from two different bodies: Akdeniz University Scientific Ethics Committee (date and number: 11/10/2021, E-50913635-774.99-189536) and Coast Guard Command (date and number: 30 September 2021, E-41476881-774.01-213271). These permissions can be found in the Annexes.

2.11. Tools, equipment, supplies, and materials

The following tools, equipment, supplies, and materials are needed to write the methodology of MMR-DACUM data.

Table 2.

Tools, equipment, supplies, and materials for enabling objective #1

• Computers • Textbooks & Articles • Databases in related field • Internet	• Quantitative analysis software (SPSS, Lisrel, etc.) • Qualitative analysis software (NVIVO, MAXQDA, Atlas, etc.) • Plagiarism Detection Software (Turnitin, Ithenticate etc.) • MS Office Programs (Word, Excel etc.) • Multi-Function Printer (MFP)

2.12. Worker Behaviors

Academic behaviors play a key role in the writing methodology of MMR-DACUM data. The behaviors that are important to your success in this task are;

Table 3.

Worker behaviors for enabling objective #1

• Assertive	• Punctual
• Flexible	• Ethical Reliable
• Professional	• Objective
• Adaptable	• Goal driven

2.13. Self-Check

Instructions: Test your knowledge of the MMR-DACUM data writing methodology by answering the following questions. For true/false questions, circle 'true' if the statement is true and circle 'false' if the statement is false. For multiple choice questions, select the most correct answer. For short answer questions, write a short answer to the question. Compare your answers with those in the following Self-Check Model Answers.

Table 4.

Self check for enabling objective #1

1. The title of the manuscript should reflect the whole manuscript and make sense. • True • False
2. Keywords reflect the whole manuscript and make sense. • True • False
3. The literature review supports your research aim and questions, and readers can understand why you are doing this research and what contribution you are making to both qualitative and quantitative research fields. • True • False
4. Write MMR-DACUM questions mutually. • True • False
5. Identify the types of designs and their variants. • True • False
6. The sampling method which supports a quantitative strand of MMR-DACUM research can be (choose more than one): a. Probability sampling b. Non-probability sampling c. Purposive sampling d. Random sampling
7. The timing of quantitative and quantitative methods can be (choose one): a. Concurrent timing b. Sequential timing
8. Determine the weight of quantitative and quantitative methods (choose one): a. Equal weight b. Unequal weight
9. Specify how to mix quantitative and quantitative methods (choose one): a. Merge the data b. Embed the data c. Connect the data
10. Identify the types of validity and reliability.
11. Why is the importance of ethics in your research? Give your reasons.

2.14. Self-check model answers

Directions Compare your answers with the model answers below.

Table 5.

Self-check model answers for enabling objective #1

1. True		
2. True		
3. True		
4. False	Write research questions for both quantitative and qualitative research separately.	
5. Model Answer	You can choose your mixed methods design and its variant according to your research objective, e.g. The convergent parallel design: the parallel databases variant, the data transformation variant, the data validation variant; the explanatory sequential design: the follow-up explanatory model, the participant selection model; the exploratory sequential design: the instrument development variant, the theory development variant; the embedded design: the embedded experimental model, the embedded relational model, the embedded instrument development and validation variant; the multi-phase design: Large-scale program, development and evaluation projects, multi-level nationwide studies, mixed-methods studies combining both concurrent and sequential phases; the transformative design: the feminist lens transformative variant, the disability lens transformative variant, the socio-economic class lens transformative variant; action study: technical action study, participatory action study, emancipatory action study.	
6. a. Probability sampling d. Random sampling		
7. b. Sequential timing		
8. b. Unequal weight		
9. c. Connect the data		
10. Model Answer	Inner Validity	• Triangulation (Qualitative Strand) • Choosing an appropriate methods of measurement (Quantitative Strand)
	Outer Validity	• Appropriate sampling method based on voluntarism to obtain top opinions and experiences (Qualitative strand) • A probability sampling method to select your subjects (Quantitative strand)
	Inner Reliability	• Data should be coded by independent researchers and Cohen's kappa coefficient should be calculated to determine inter-rater reliability of themes (qualitative strand) • Measurements should be applied consistently (quantitative strand).
	Outer Reliability	• All data collected should be used to meet needs. (Qualitative strand) • The conditions for research should be standardized (Quantitative strand).
11. Model Answer	If you do not keep up with ethical procedures in the research, your research become meaningless and you can get some penalties by the ethical committee in your institution and as a scientist you have a bad reputation'(Gunbayi,2018).	

2.15. Practice exercise

You should follow the directions below for the practice exercise for enabling objective #1:

- Check your ability to write up the methodology of the MMR-DACUM data using the following checklist as a guide.
- Discuss the basics of this task with your co-researcher.
- Practice each stage of writing the MMR-DACUM data methodology.

- Ask your co-researcher or supervisor to use the checklist to assess your ability to carry out this task.

Table 6.

Practice exercise for enabling objective #1

Writing the Methodology of Mixed methods Data			
Actions	**Level of Performance**		
	Yes	**With Help**	**No**
When writing the methodology of mixed methods data, the learner...			
1. Determine the appropriate title for the manuscript.			
2. Complete abstract and keywords that accurately reflect the content.			
3. Research problem clearly defined, linked to relevant literature, up to date, completed with literature review with appropriate references.			
4. Define research questions appropriate to the research objective, both quantitative and qualitative strands of research.			
5. Select mixed methods design appropriate to the aim of the research.			
6. Select the timing of quantitative and quantitative methods.			
7. Determine the weight of quantitative and quantitative methods.			
8. Specify how to mix quantitative and quantitative methods.			
9. Explained sampling methodology, selected appropriate sampling size for both quantitative and qualitative strands of research.			
10. Explained data collection method through qualitative (semi-structured individual and focus group interviews, organised observations and collected documents) and quantitative (experiments, surveys, tests and scales) forms and instruments.			
11. Steps taken to ensure the reliability and validity of the study for both quantitative and qualitative strands of research.			

Level of performance: Upon completion of this exercise, participants should be able to discuss and execute each of the actions with confidence. It is expected that all items on the checklist will receive a rating of 'Yes'. In the event that a 'With help' or 'No' rating is received for any item; participants are advised to conduct a review of their performance in consultation with their mentor.

3. Analyzing MMR-DACUM Data

As illustrated in Table 7: Learning Experience #2, it is imperative to adhere to the sequence of learning activities, meticulously attending to the specific instructions in the practical analysis of MMR-DACUM data.

Table 7.

Learning experience #2

Enabling Objective #2: Practice Analysing Mixed methods Data	
Learning Activities	**Special Instructions**
Read the Information Sheet titled 'Practice Analyzing MMR-DACUM Data' on 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8 and 3.9.	
Watch the qualitative and quantitative data analysis video, read quantitative and quantitative data analysis tutorials and identify the important messages to convey about your university when analyzing MMR-DACUM data.	You can easily find great videos on **qualitative and quantitative data analysis** on platforms like YouTube. Here are some search terms you can use: • **"Qualitative Data Analysis Explained"** • **"Quantitative Data Analysis Tutorial"** • **"Qualitative vs Quantitative Data Analysis"**

	You can also check out educational platforms like **Coursera, edX,** or **Khan Academy** for more structured learning on these topics.
Discuss with the mentor expert in MMR-DACUM at your faculty the methods he or she uses to analyze MMR-DACUM data. What would you have to do differently?	
Demonstrate your knowledge of analyzing MMR data by completing the Self-Check on 3.9	
Check your answers against the Self-Check Model Answers on 3.10	Ask your mentor to suggest a co-researcher who can observe and help you with your practice sessions and the Practice Checklist.
Practice Analyzing MMR-DACUM data while the academic staff expert in MMR observes and offers help as needed. Ask the academic staff expert in MMR-DACUM to use the checklist titled 'Practice Analyzing Mixed methods Data 'on 3.11 to assess your progress.	

3.1. Conducting the DACUM Workshop and Analysing

DACUM occupational analysis is one of the widely used small-group methods for conducting occupational function analysis (Duzguncinar& Gunbayi, 2020). It uses focus groups of people who perform the occupation to identify the tasks and duties involved in a particular occupation (Jacobs, 2019). The DACUM occupational analysis should be conducted by certified DACUM facilitators under the standards in the DACUM manual.

For example, the conducting procedure of DACUM workshops in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` is as follows:

> DACUM was conducted for officers serving in four different maritime jurisdictions of the Coast Guard (Black Sea, Marmara Sea, Aegean Sea and Mediterranean Sea). Each of these analyses lasted for two days, with morning and afternoon sessions, and a total of 24 officers, both men and women, participated in the workshops. The permission of the Coast Guard was requested for the DACUM workshops to be held and the administration allowed the participation of officers who did not have any duty at that time. The participants covered their transport, food and accommodation expenses and no budget expenditure was made in this direction. All of the officers who participated in the sessions stated that they volunteered for the study, and their permission was obtained through the Participant Permission Form [Annex 4]. A seven-stage procedure was applied by the DACUM mechanics (Northon, 1995). Firstly, an orientation presentation explaining the method of the workshop, the role of the participants (facilitator, secretariat and panelists) and the basic rules of the workshop was made for the participants to adapt to the workshop. Then, the definition of the Coast Guard officer profession was reviewed with the participants. To form the basis of the DACUM workshop, the panelists stated in order which duties they performed as a Coast Guard officer, and the secretariat recorded them on the boards for everyone to see. In the next stage, these statements of the officers were categorized as 'duty' and 'task'. At this stage, the tasks were listed in columns on the far left of the DACUM board, while the work performed under each task was placed to the right of the relevant task. The panelists then ranked the tasks and then the tasks under each task in order of priority. In the next step, the participants identified the knowledge, skills and behaviors that an officer should possess, the equipment and materials they use, the threats and opportunities for the officer profession, and the abbreviations they use during the performance of the task. In the final part, the participants carefully reviewed all the DACUM materials they produced during the two days. This procedure was rigorously followed during the DACUM exercise in all four regions.

3.2. Analyzing the findings of qualitative data collected via DACUM

The findings of the DACUM workshops should be analysed under the headings of knowledge and skills, especially duties and tasks, behaviors, systems and devices used, abbreviations, and future trends in accordance with the DACUM mechanics (Norton, 1995; Jacobs, 2019).

For example, the DACUM chart in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` is as fallows:

Table 4.1. Officer DACUM Analysis

Duty	Task
A. Supervision	A.1 Keep the Morale of the Staff High
	A.2 Be able to carry out disciplinary procedures
	A.3 To be able to organise personal files
	A.4 Be able to make evaluation process
	A.5 To be able to ensure staff coordination
	A.6 To be able to plan personnel leaves
	A.7 Be able to prepare the shift schedule
	A.8 Be able to follow the health status of the personnel
	A.9 To be able to make personal transactions of personnel
	A.10 Be able to give feedback to his/her staff
	A.11 To be able to control the dress and attire of the personnel
	A.12 To be able to observe the personal rights of the personnel

…

When the tasks under each task in the DACUM occupational analysis table are analyzed, it is seen that the most jobs are defined for 'Performing Law Enforcement Duties' with 36 jobs. This is followed by 'Being a Supervisor, 'Keeping the ship ready for navigation and duty' and 'Conducting law enforcement affairs' with 12 tasks. This situation shows that the most complex tasks of the officers are law enforcement and maritime activities and that they make more effort to perform these tasks. The fact that only five tasks were identified for the task of 'Conducting Intelligence Affairs' shows that this task is more apparent to the officers and does not require a complex sequence of operations.

3.3. Creation of the Occupational Analysis Scale (OAS)

The OAS, which is also used in the quantitative phase of the study, has been prepared in accordance with the data obtained from the DACUM in four sections; (1) demographic information about the participants, (2) duties, (3) tasks, (4) knowledge and skills to be possessed, tools, equipment and materials used, behaviors expected, (5) tendencies for the future of the occupation. In this section, respondents should choose an option between 5, the highest, and 1, the lowest, for the level of performance of the work under the task. In the other sections, if they agreed with each statement, they should tick the box next to it. Since all the data in the questionnaire are taken from the DACUM, there is no need for a pilot study or expert opinion to test the reliability and validity of the questionnaire.

For example, the OAS in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` is as follows:

Annex-2. OCCUPATIONAL ANALYSIS SCALE

Occupational Analysis Questionnaire Prepared within the Scope of DACUM Analysis Application Regarding the Occupations of Coast Guard Officers

Hello, this questionnaire is designed as a data collection tool of a research conducted to determine the level of distribution of the tasks performed by the officers serving in the floating elements of the Coast Guard Services class within the scope of their occupational analyses. The purpose of this study; The purpose of this study is to make an occupational analysis of the duties performed by coast guard officers in their profession and to analyse their opinions on the level of realization of their duties in line with the issues determined in this analysis.

PART I.

The region where you are currently working (Please "x" for only one)
Black Sea ( )
Marmara and Straits ( )
Aegean (.)
Mediterranean ( )

PART II

Tasks Performed Under Tasks
In this section, you are expected to evaluate the extent to which each task is personally performed by the officers. While making your evaluation, you are asked to indicate your degree of agreement with the following statements by marking the appropriate option (x), with a minimum of 1 and a maximum of 5. Please tick one level for each statement.

1. Level of Realization of the Works Performed under the Task of Executing Supply and Logistics Affairs

Tasks	1	2	3	4	5
Should be able to follow the feeding procedures					
Ensure that the inventory list is up to date					
Ensure the operation of the ship's buffet					
To be able to carry out Scrap Wreckage Dilapidated (HEK) Operations					
Should be able to follow procurement activities					
Should be able to procure services					
Should be able to apply saving measures					
To be able to make Movable Goods Record Deletion Operations					

3.4. Analyzing the findings of quantitative data collected via OAS

In the quantitative strand, data analysis is to be conducted on the results of experiments, quasi-experiments, questionnaires, scales and tests. The utilization of quantitative research methodologies, such as experiments, quasi-experiments, surveys, correlation studies, longitudinal studies, and so forth, is the sole acceptable method of generating data based on objective measurement and analysis. This assertion is supported by the works of Gunbayi & Sorm (2018), who posit that the objective of quantitative research is the collection of numerical data that can be analysed using statistical methods. The utilization of a computer program designed for quantitative data analysis, such as SPSS, can facilitate the analysis process.

For example, analysing methodology of the quantitative data in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` is as follows:

> The quantitative data of the study were obtained from the MLS and analyzed using the SPSS 25 package. The basis of quantitative research is to measure, prove and generalize the universe. Therefore, the values obtained from the MLS were converted into numerical averages. In the study, descriptive statistics were used to analyze the data relating to the duties of the officers and the tasks performed in the course of their duties. Descriptive statistics, which are considered part of applied statistics along with predictive statistics, are used to summarize or explain the collected data (Suleymanova & Omuraliev, 2015). Researchers use descriptive statistics when they need to summarize a sample numerically or graphically. Correlation analysis (CA) was used to analyze whether there was a relationship between the duties of the officers, as determined by the DACUM occupational analysis. CA is a scientific statistical technique that tests the direction and strength of a relationship between two variables (Diggle & Chetwynd, 2011). Multiple frequency analysis and chi-square test were used to test whether the difference between the observed frequencies and the expected frequencies of the other information obtained in the occupational analysis (knowledge, skills, expected behaviors, tools and materials used, threats and opportunities for the officer occupation) was statistically significant. The Chi-square test measures whether the difference between the observed and expected frequencies is statistically significant (Büyüköztürk, 2005). This test is expressed in degrees of freedom (SD) and is generally used to (1) test whether there is a difference between two or more groups, (2) test whether there is a relationship between two variables, and (3) test for homogeneity between groups. The chi-square test is used when the groups are independent of each other (Güngör, 2008).
>
> The results of the descriptive statistical analysis of the level of realisation of the duties of the officers within the framework of DACUM occupational analysis are given in Table 4.9.

Table 4.9. Level of Realisation of Officers' Duties

Variable	*N*	$\bar{X}$	*SS*
Supervising	217	4,55	0,49
Keeping the ship ready for navigation and duty	217	4,67	0,46
Conducting training activities	217	4,45	0,64
Monitoring	217	4,48	0,56
Conducting protocol affairs	217	4,65	0,53
Conducting law enforcement affairs	217	4,55	0,55
Watchkeeping	217	4,66	0,53
Conducting Intelligence affairs	217	4,44	0,71
Performing Coast Guard duties	217	4,59	0,58
Conducting supply and logistics activies	217	4,28	0,82

When the table is analyzed, it is seen that the realization level of all of the officers' duties determined as a result of the DACUM analysis is at the "Very High" level. Among the duties, 'Conducting Supply and Logistics Affairs' was realized at the lowest level (4,28) and 'Keeping the Ship Ready for Navigation and Mission' at the highest level (4,67).

3.5. Analyzing the findings of qualitative data collected from interviews descriptively and doing content analysis

As explained in 3.1, the first step is to transcribe the individual interviews, review them repeatedly, and code them regularly using the qualitative software NVIVO. Then, the frequency analysis according to the coded themes and sub-themes can be shown, and the data can be analyzed descriptively under this table in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` is as follows:

Table 4.28. Tasks Mentioned by the Officers in the Focus Group Discussion

Duties	Code of Participants	F	%
Supervising	KA, KB, KC, KD, KE, KF	6	100
Keeping the ship ready for navigation and duty	KA, KB, KD, KE	4	66
Conducting training activities	KA, KC, KD	3	50
Monitoring	KB, KD, KE	3	50
Conducting protocol affairs	KB, KC	2	33
Conducting law enforcement affairs	KA, KB, KE, KF	4	66
Watchkeeping	KA, KB, KC, KD	4	66
Conducting Intelligence affairs	KA, KC, KD	3	50
Performing Coast Guard duties	KB, KC, KD	3	50
Conducting supply and logistics activies	KA, KC	2	33

When the table is analysed, it is seen that the participants mentioned the task of 'Supervising' the most (100%). The participants mentioned the tasks of 'Conducting Protocol Affairs' and 'Conducting Supply and Logistics Affairs' as the least (33%).

4.3.1. Findings on the Task of 'Supervising'

The distribution of the officers who mentioned the duty of 'Supervising' is presented in Table-4.29.

Table-4.29 Distribution of the officers who mentioned the duty of supervising

Duty	KA	KB	KC	KD	KE	KF
Supervising	√	√	√	√	√	√

When the table is analyzed, it is seen that all of the participants mentioned the task of 'being a supervisor'. The opinions of some of the participants about the task of 'Supervising' are as follows

"I would like to emphasize that the sub-heading of keeping the morale of the staff high should be elaborated. In the 12-item DACUM analysis, I think that the definition of supervision is summarized in general. I think that details can be given by creating sub-items. When we say to supervise, I think that the big picture is seen in the general framework by looking at these items." (KA-1,1)

"I think that other important items can be gathered under one roof under the item 'Being a Supervisor' in the DACUM analysis." (KB-1,2)

3.6. Analysis of the results of the qualitative data collected during the interviews with the focus groups

To analyze the data derived from focus group interviews, it is first necessary to create a transcript of the interviews, which should then be reviewed repeatedly and continually coded by the procedures outlined in sections 3.5.

3.7. Analyzing the findings of qualitative data collected via documents

In the context of data analysis, it is imperative to meticulously review and systematically code the data collected from documents. This process should be undertaken with the same rigour and consistency as employed in Section 3.5.

For example, analyzing the quantitative data from documents in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)` is as follows:

> The document analysis was based on the legislation (Official Journal, 1982), regulations (T.C. Official Journal, 2017) and the regulation (Coast Guard, 2021) published for the personnel serving in the floating elements of the Coast Guard. The purpose of the mentioned legislation is to define the duties, powers and responsibilities of the personnel serving in the floating elements within the organizational structure of the Coast Guard. The duties of the officers serving in the floating elements of the Coast Guard, which are the subject of this study, are regulated by the regulation (Coast Guard, 2021) published on the basis of the law and the policy. According to this policy, the floating elements within the organizational structure are obliged to fully comply with the matters specified in the directive. In the directive, the duties of the officers are divided into four sections: civil duties, judicial duties, military duties and individual duties of the personnel. The comparison of these duties with the duties obtained in the DACUM occupational analysis is presented in Table-4.39.

Table-4.39 Comparison of the Tasks Obtained in the DACUM Occupational Analysis with those in the Regulations

Duty	Number of Tasks in the Legislation
Supervising	12
Keeping the ship ready for navigation and duty	10
Conducting training activities	7
Monitoring	10
Conducting protocol affairs	4
Conducting law enforcement affairs	32
Watchkeeping	8
Conducting Intelligence affairs	4
Performing Coast Guard duties	9
Conducting supply and logistics activies	8

3.8. Tools, equipment, supplies, and materials

The following tools, equipment, supplies and materials are required for the analysis of MMR-DACUM data:

Table 8.

Tools, equipment, supplies, and materials for enabling objective #2

• Voice recorder	• Quantitative analysis software (SPSS, Lisrel,etc.)
• Camera	• Qualitative Analysis Software (NVIVO)
• Computers	• Plagiarism Detection Software (Turnitin, Ithenticate)
• Textbooks, Articles	• Ms Office
• Databases in related field	• Internet
• Dissertations	• Printer/scanner/fax

3.9. Worker behaviors

Academic behaviour plays a key role in the analysis of MMR-DACUM data. The behaviours that are important to your success in this role are

Table 9.

Worker behaviors for enabling objective #2

• Careful	• Self-motivated
• Detail oriented	• Flexible
• Hardworking	• Trustworthy
• Creative	• Adaptable
• Innovative	• Ethical Reliable

3.10. Self-check

Instructions: Check your knowledge of the practice of analysing mixed methods data by answering the following questions. For true/false questions, circle 'true' if the statement is true and circle 'false' if the statement is false. For multiple-choice questions, choose the most correct answer. For short answer questions, write a short answer to the question. Compare your answers with those in the following Self-Check Model Answers.

Table 10.

Self- check model questions for enabling objective #2

1. Identify the main reason for using mixed methods data in a single study.
2. Identify the steps in analysing qualitative data.
3. In quantitative data analysis, data should be organised categorically and chronologically, checked repeatedly and coded continuously. a. True b. False
4. In ..... you can analyse the data in depth by explaining the relationship between the independent variable and the dependent variable. a. Thematic analysis b. Descriptive analysis c. Content analysis d. Kappa
5. What is the difference between NVIVO and SPSS software?

3.11. Self-check model answers

Directions: Compare your answers to the self-check with the model answers provided below.

Table 11.

Self-check model answers for enabling objective #2

1. Model Answer Mixed methods data provide a more complete understanding than either quantitative or qualitative alone
2. Model Answer Qualitative data analysis includes three steps: thematic analysis, descriptive analysis and content analysis.
3. False During quantitative data analysis data are organized in terms of numbers based on the results of experiments, quasi-experiments, questionnaires, scales, tests.
4. c. Content analysis
5. Model Answer

The qualitative data analysis program NVIVO facilitates the organization of data and recodes, nodes, and other elements, thereby supporting researchers in their analysis of qualitative data. It provides a workspace and a range of tools that enable researchers to efficiently manage their information. Conversely, SPSS statistics software is utilized exclusively for performing statistical operations on quantitative data.

Level of Performance: The responses given to the items on the Self-Check must match the Self-Check Model Answers. If some points are missed or questions arise, the Information Sheet should be consulted, or, if necessary, the mentor should be approached for guidance.

3.12. Practice Exercise

You should follow the directions below for the practice exercise for enabling objective #2:

- The following activities are to be conducted under the checklist provided.
- It is imperative to continue practising until a 'Yes' rating is achieved for each item on the checklist provided in this Practice Exercise.
- The activities should then be checked by a colleague using the checklist below.

Table 12.

Practice exercise for enabling objective #2

Analyzing MMR-DACUM Data			
Actions	**Level of Performance**		
	Yes	**With Help**	**No**
When analyzing MMR data, the learner...			
1. Conduct the DACUM professional analysis by certified DACUM facilitators according to the standards in the DACUM handbook.			
2. Analyze the findings from the DACUM workshops in accordance with the DACUM mechanics under the headings of knowledge and skills, especially tasks and jobs, behaviors, systems and devices used, acronyms and future trends.			
3. Prepare and implement the OAS, which will also be used in the quantitative phase of the study, in line with the data obtained from DACUM.			
4. Analyze the findings of quantitative data collected via OAS			
5. Analyze the findings of qualitative data collected from interviews descriptively and doing content analysis			
6. Analyze the findings of qualitative data collected via documents			

Level of performance: By the end of this exercise, you should be able to discuss and carry out each of the actions in this exercise with confidence. Your ratings on the checklist for this exercise should be 'Yes' for all items. If you have received ratings of 'With Help' or 'No' for any of the items, review your performance with your mentor.

4. Discuss and conclude results

As seen in Learning Experience #3, you should follow the steps of the learning activities, paying attention to the special instructions in the practice discussing and concluding results of MMR-DACUM data.

Table 13.

Learning experience #3

Enabling Objective #3: Practice discussing and concluding results of MMR-DACUM data	
Learning Activities	**Special Instructions**
Read the information sheet entitled 'Practicing, discussing and concluding the results of MMR-DACUM data' on 4.1, 4.2, 4.3 and 4.4, 4.5 and 4.6.	
Watch the video on Discussing and Concluding Results of MMR-DACUM Data Analysis, read the tutorials on Quantitative Data Analysis and identify the important messages to convey about your academic position at university when discussing and concluding results of MMR-DACUM data.	You can easily find great videos on **qualitative and quantitative data analysis** on platforms like YouTube. Here are some search terms you can use: • **"Qualitative Data Analysis Explained"** • **"Quantitative Data Analysis Tutorial"** • **"Qualitative vs Quantitative Data Analysis"** You can also check out educational platforms like **Coursera, edX,** or **Khan Academy** for more structured learning on these topics.
Discuss with the mentor expert in MMR-DACUM at your faculty the methods he or she uses to analyze MMR-DACUM data. What would you have to do differently?	
Demonstrate your knowledge of analyzing MMR data by completing the Self-Check on 4.7.	
Check your answers against the Self-Check Model Answers on 4.8.	Ask your mentor to suggest a co-researcher who can observe and help you with your practice sessions and the Practice Checklist.
Practice Analyzing MMR-DACUM data while the academic staff expert in MMR observes and offers help as needed. Ask the academic staff expert in MMR-DACUM to use the checklist titled 'Practice Analyzing Mixed methods Data 'on 4.9. to assess your progress.	
Arrange to complete this Learning Guide entitled 'Systematic Curriculum and Instructional Development for a Mixed Methods Research-DACUM: SCID-MMR-DACUM' by asking your mentor to assess your performance using the criteria in the performance test on 5, 5.1.	

4.1. Discussing results of MMR-DACUM

It is essential to determine the findings to be prioritised and to engage in a thorough analytical discussion, with a focus on identifying the findings from previous studies that significantly contribute to the phenomena under investigation. Additionally, it is crucial to examine the similarities and differences between the present MMR-DACUM and previous studies, thereby ensuring a meaningful contribution to the existing research literature.

For instance, an analytical discussion of the contributions of qualitative and quantitative findings to the phenomena of the research is warranted. This discussion is to be based on the drawing of conclusions from the qualitative and quantitative findings during the overall interpretation at the conclusion of the research in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)`, as follows.

> The data obtained through the DACUM job analysis are similar to the results of the officer job analysis conducted by Kâhya et al. (2022) for district gendarmerie commanders and another armed law enforcement officer, using the

document review and content analysis method. This study analyzed officers' duties under the headings of general duties, civil duties, judicial duties, military duties, and judicial duties. Just as it was concluded that the district gendarmerie commanders have a large number of duties resulting from legislation and orders, the DACUM analysis shows that the most intensive duty in terms of the number of tasks performed under the task is 'execution of law enforcement affairs', which is justified by the legislation itself. The above-mentioned study mentions that district gendarmerie commanders, by virtue of their position as senior officers, are obliged to act as role models for their subordinates. The questions here refer to the task of 'acting as a supervisor' identified by the officers in the DACUM occupational analysis. Compared to the study on district gendarmerie commanders, it can be said that the DACUM occupational analysis is a powerful method of analysis that examines the officer profession in depth in every dimension and contains more information about coast guard officers.

4.2. Summarizing and concluding results of MMR-DACUM

It is crucial to determine a significant conclusion that is consistent with the findings of the research. This will ensure that readers who briefly review the summary and conclusion of the research are not aware of the MMR-DACUM and are able to cite the research.

For instance, summarizing and concluding of the MMR-DACUM in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)`, as follows.

> The present study examined the applicability of the DACUM method to the officers' duties, with the results of the DACUM analysis being used to measure the level of realisation of the officers' duties. The findings demonstrated that the level of realisation of the officers' duties was high and consistent across all duties, thus validating the efficacy of the DACUM approach. The methodology of DACUM is derived from real-life experiences of those who perform the profession, thereby ensuring its relevance and applicability. As Norton (1997) asserts, employees (in this case, officers) possess the capacity to define their occupations and elucidate their tasks with greater precision than any other group. An efficacious approach to defining an occupation entails the identification of performance indicators exhibited by the occupation's experts.

4.3. Reporting recommendations of MMR-DACUM

It is incumbent upon the author to determine which recommendations to propose for both practitioners and researchers. These recommendations must be both attractive and innovative and must be consistent with the author's findings. The publication of research findings has the potential to influence prospective researchers, thereby enabling the author to guide them and establish a reputation as a renowned scholar in their field.

For instance, reporting recommendations of the research in the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)`, as follows.

> This study analyses the duties of officers within the Coast Guard. However, it is important to note that the Coast Guard personnel structure also comprises petty officers, specialised non-commissioned officers, civil servants and labourers in addition to officers. The critical tasks performed by these personnel, other than the officers, affect the performance of the floating elements and the officers who are the subject of this study. Consequently, conducting occupational analyses for these personnel can elucidate the discrepancies between the desired and actual situations in domains such as personnel mobility, attitude surveys, and supervisor-subordinate relations. Such analyses can also serve to update the fundamental tasks.

4.4. Writing references and adding appendices of MMR

It is also the responsibility of the author to ensure that the references are organised correctly, whether in number or alphabetical order. This is to be done by the author's guidance of the journal for which the manuscript is being submitted, as well as the journal's manuscript writing guidelines. Failure to comply with these instructions may result in the manuscript being rejected or returned to the author for redesign by the journal's reviewers and editors.

For example, an organization and writing references of the study 'DACUM analysis of the coast guard officers and their views on the level of accomplishment of their duties: Multi-stage mixed method research (Duzguncinar, 2023)`, as follows.

Table 14.

A sample of writing of references

References

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Alaç, A. E. (2010). Türk polis teşkilatında insan kaynakları yönetiminde iş analizlerinin işe alma ve eğitim müfredatlarının oluşturulmasındaki önemi. *Polis Bilimleri Dergisi*, 12(4), 75-94.

Aliyeva, A. (2017). Şirketlerde İş Analizi ve İş Dizaynının Önemi ve Örnek Uygulama. Yayımlanmamış Yüksek Lisans Tezi, Beykent Üniversitesi Sosyal Bilimler Enstitüsü, İstanbul.

Ash, R. A. (1988). Job analysis in the world of work. In S. Gael (Ed.), The job analysis handbook for business, industry, and government (Vol. I, pp. 3–13). New York, NY: Wiley

Source: Duzguncinar (2023)

It is also recommended that appendices be included, such as a consent form, ethical committee approval, and formal permissions, including Institutional Review Board (IRB) approval from institutions, interview forms, and questionnaires. The following serves as an example of a consent form:

Table 15.

A sample of consent form

Participant Consent Form

By signing this form, I indicate that I agree to participate in a study conducted by Tarkan DÜZGÜNÇINAR on 'Coast Guard Officers' DACUM Analysis of their Professions and their Opinions on the Level of Realisation of their Duties'.
It also indicates that I have read and understood the following information before giving it:

- I am a volunteer and can withdraw from the study at any time.
- There is no risk of physical or psychological harm.
- The information I provide will be kept strictly confidential and all data will be collected and analysed by the researcher and stored securely. It will then be destroyed after the report has been officially submitted.
- I will receive a summary of the study upon request.
- I authorise the researcher to conduct the research and to publish its results.
- I, (Name and Surname), agree to participate in this data collection.

Signature of the Participant (Date, ... / .... / ....)

Source: Adapted from Duzguncinar (2023).

4.5. Tools, equipment, supplies, and materials

The following tools, equipment, supplies and materials are required for the analysis of MMR-DACUM data:

Table 16.

Tools, equipment, supplies, and materials for enabling objective #3

• Computers • Textbooks, Regulations, Articles • Databases in related field • Internet • Printer/scanner/fax	• Quantitative analysis software (SPSS, Lisrel,etc.) • Qualitative Analysis Software (NVIVO) • Plagiarism Detection Software (Turnitin, Ithenticate) • Ms Office

4.6. Worker behaviors

Academic behavior plays a key role in the analysis of MMR-DACUM data. The behaviors that are important to your success in this role are

Table 17.

Worker behaviors for enabling objective #3

• Proactive • Leader • Open-minded • Creative • Innovative	• Flexible • Trustworthy • Adaptable • Objective

4.7. Self-check

Instructions: Check your knowledge of the practice of analyzing mixed methods data by answering the following questions. For true/false questions, circle 'True' if the statement is true and circle 'False' if the statement is false. For multiple-choice questions, choose the most correct answer. For short answer questions, write a short answer to the question. Compare your answers with those in the following Self-Check Model Answers.

Table 18.

Self- check model questions for enabling objective #3

1. Decide where and how to mix the quantitative and qualitative strands while discussing the findings and which findings to take priority and discuss analytically. True False
2. Not necessarily write significant conclusions consistent with the findings. True False
3. When does a researcher mix quantitative and qualitative strands in an MMR, when he/she decides on an independent level of interaction?
4. How should the references be organized? Why?
5. Why should the researcher decide what recommendations to make to both practitioners and researchers by proposing attractive and innovative recommendations that are consistent with the findings?

4.8. Self-check model answers

Directions: Compare your answers to the self-check with the model answers provided below.

Table 19.

Self check model answers for enabling objective #3

1. True
2. False The researcher only mixes the two strands when drawing conclusions in the overall interpretation at the end of the study.
3. False During quantitative data analysis data are organized in terms of numbers based on the results of experiments, quasi-experiments, questionnaires, scales, tests.
4. Model Answer The researcher should organize the references in numerical or alphabetical order, taking into account the guidelines for authors of the journal you are submitting to and its guidelines for writing manuscripts. Failure to do so may result in the manuscript being rejected or returned to you for revision by the reviewers and editors of a journal.
5. Model Answer As a scholar, published manuscript can influence future researchers, so he/she can lead them, and can lead fellow scientists in the field.

Level of Performance: The responses given to the items on the Self-Check must match the Self-Check Model Answers. If some points are missed or questions arise, the Information Sheet should be consulted, or, if necessary, the mentor should be approached for guidance.

4.9. Practice Exercise

You should follow the directions below for the practice exercise for enabling objective #3:

- The following activities are to be conducted under the checklist provided.
- It is imperative to continue practicing until a 'Yes' rating is achieved for each item on the checklist provided in this Practice Exercise.
- A colleague should then check the activities using the checklist below.

Table 20.

Practice test for enabling objective #3

Analyzing MMR-DACUM Data			
Actions	**Level of Performance**		
	Yes	**With Help**	**No**
When discussing and concluding results of a MMR-DACUM data, the learner...			
1. Discuss the findings using key themes according to the results of the qualitative and quantitative data collected according to the MMR design.			
2. Explain why this study is being done and its implications			
3. Report recommendations for both practitioners and researchers			
4. Order references systematically and consistently			
5. Keep appendices for outer reliability			

Level of performance: By the end of this exercise, you should be able to discuss and carry out each of the actions in this exercise with confidence. Your ratings on the checklist for this exercise should be 'Yes' for all items. If you have received ratings of 'With Help' or 'No' for any of the items, review your performance with your mentor.

5. Performance Test

You are to complete the task of developing an MMR-DACUM manuscript based on the SCID as required. Your mentor will assess your performance using the criteria in the Performance Test and Performance Standards in Table 21 and Table 22 below.

Table 21.

Performance test for developing a MMR manuscript.

Learner's Name:		Date
Competency: ***Developing a MMR-DACUM manuscript based on SCID.***		Test Attempt 1st 2nd 3rd
Mentor's Signature/Approval	**Overall Evaluation**	
	Level Achieved	**Performance Levels**
Directions: The mentor will provide the researcher with one or more opportunities to write an MMR manuscript, and the researcher will be responsible for taking the necessary actions to deal with the situation in a way that meets the researcher's academic requirements and research ethical practices. The mentor will assess the researcher's performance using the criteria below.		4 – Can perform this skill without supervision and with initiative and adaptability to problem situations.
		3 – Can perform this skill satisfactorily without assistance or supervision
		2 – Can perform this skill satisfactorily, but requires some assistance and/or supervision.
		1 – Can perform parts of this skill satisfactorily but requires considerable assistance and/or supervision.
	Mentor will initial level achieved.	

5.1. Performance standards

Following the completion of the task of developing a MMR-DACUM manuscript, the next step is to complete the performance standards. If any item receives a 'NO' response, consultation with a mentor is required to determine the additional activities necessary to achieve competency in the weak area(s) of developing a MMR-DACUM manuscript based on SCID.

Table 22.

Performance standards for developing a MMR manuscript based on SCID

For acceptable achievement, all items should receive a 'Yes' or 'N/A' response.	Yes	No	N/A
When developing a MMR manuscript, the learner...			
1. Defined the research problem and aim clearly,			
a. Tied to the relevant literature,			
b. Up to date,			
c. Completed with literature review with appropriate references			
2. Determined research questions appropriate with research aim for both quantitative and qualitative strand of research			
3. Explained what mixed typed designs and variants chosen:			
a. The convergent parallel design: The parallel-databases variant, The data transformation variant, the data-validation variant			

b. The explanatory sequential design: Follow-up explanations model, participant selection model
c. The exploratory sequential design: Instrument-development variant, theory-development variant
d. The embedded design: Embedded experimental model, embedded correlational model, embedded instrument development and validation variant
e. The multi-phase design: large-scale program development and evaluation projects, multi-phase studies, single mixed-methods studies combining both concurrent and sequential phases
f. The transformative design: the feminist lens transformative variant, the disability lens transformative variant, the socio-economic class lens transformative variant.
g. Action study: Technical Action Study, Participatory Action Study, Emancipatory Action Study
4. Selected mixed methods design consistent with the aim of the research
5. Explained sampling methodology, selecting the correct sample size for both quantitative and qualitative research.
6. Explain the data collection method for both quantitative and qualitative strands of the research. a. Qualitative strand: interviews: individual and focus group, participatory observations, documents.
b. Quantitative area: experiments, questionnaires, scales, tests, annual statistics, etc.
7. Steps taken to ensure the reliability and validity of the study for both quantitative and qualitative aspects of the research.
8.Accurately reported ethical procedures (e.g. avoiding plagiarism, ensuring anonymity of participants, obtaining written consent from participants, formal approvals, Institutional Review Board (IRB)).
9. Analyzed MMR data separately or together, taking into account the interaction, timing, priority and mixing of qualitative and quantitative data, based on mixed design or variant choices. a. Organized qualitative data - interviews: individual and focus group, participatory observations, documents - categorical and chronological, repeatedly reviewed, continuously coded.
b. Organized quantitative data - experiments, questionnaires, scales, tests, annual statistics, etc. - in terms of numbers.
10. Discussed findings using main themes of findings from qualitative and quantitative data collected according to MMR design choices via: a. Qualitative strand: Interviews - individual and focus group, participant observation, documents
b. Quantitative strand: Experiments, questionnaire, scales, tests, annual statistics etc.
11. Outlined why this study is done and its implications 12. Reported recommendations both for practitioners and researchers
13. Ordered references systematically and consistently a. Kept appendices for outer reliability

Level of Performance: It is requisite that all items receive a YES or NO response. In the event of any items receiving a NO response, consultation with the relevant mentor is required in order to ascertain the additional activities necessary to achieve competency in the weak area(s).

6. Conclusion

This study presents a learning package that provides the necessary knowledge, attitudinal information and practice opportunities to enable the development of a MMR-DACUM manuscript based on SCID (Norton & Moser, 2013). The package is designed to impart the knowledge and skills required to perform the task of developing a MMR-DACUM manuscript based on SCID.

The learning package has been designed to facilitate understanding of complex concepts, skills and attitudes, with the objective that these can be accepted and applied by all learners in the process of developing a MMR-DACUM manuscript. The learning package has been developed to suggest basic steps in developing a MMR-DACUM manuscript that academic staff and master/doctoral students in the social sciences can follow. The package is designed to be practised by the learner in order to facilitate understanding of how to perform the task of developing a MMR-DACUM manuscript effectively.

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Conflicts of Interest

No conflict of interest has been declared by the author

Author Contribution

Corresponding author Tarkan Duzguncinar: Conceptualization, data curation, investigation, methodology, writing original draft, review & editing.

Declaration of Competing Interest

This research did not receive any specific grant from funding agencies in the public, commercial or non-profit sectors.

Ethics Approval

In the writing process of the study titled "**Systematic curriculum and instructional development for a mixed methods DACUM research: SCID MMR-DACUM**", the rules of scientific, ethical and citation were followed; it was undertaken by the author of this study that no falsification was made on the collected data. "Journal of Action Qualitative & Mixed Methods Research and Editor" had no responsibility for all ethical violations to be encountered, and all responsibility belongs to the author and that the study was not submitted for evaluation to any other academic publishing environment.

Institutional review board (IRB) approval

Institutional Review Board (IRB) approval of this research is not required.

Data Availability Statement

Anonymized data from this study can be made available on request from t.duzguncinar@antalya.edu.tr

APPENDIX 1 Duty/Task: SCID for a MMR-DACUM

STEPS (Required to Perform the Task)		PERFORMANCE STANDARDS (Observable & Measurable Criteria)		TOOLS, EQUIPMENT, SUPPLIES & MATERIALS (Needed)		REQUIRED KNOWLEDGE AND SKILLS (Math, Science, & Language)		SAFETY (Concerns)	
1	Determine the title of the manuscript.	1	Determined title appropriate with the manuscript	1	Reference books, articles, dissertations	1	Master / PhD degree in the related field	1	N/A
2	Write the abstract and key words.	2	Completed abstract and key words that reflected the content accurately	2	Database searching engine	2	Decision Making,	2	N/A
3	Review the literature.	3	Defined the research problem clearly, tied to the relevant literature, up to date, completed with literature review with appropriate references	3	Textbooks, articles, dissertations	3	Knowledge of research problem in theory and philosophy of social sciences (the paradigm on which the method of the research is based),	3	Avoiding plagiarism
4	Explain the research aim and write research questions for both quantitative and qualitative strands of research.	4	Determined research questions appropriate with research aim both quantitative and qualitative strands of research	4	Textbooks, articles, dissertations related to research aim and questions	4	Knowledge of how to state main and sub research questions for both quantitative and qualitative strands of research	4	N/A
5	Explain what mixed typed designs chosen.	5	Selected mixed typed design consistent with the aim of the research	5	Reference books and articles on mixed typed research methods	5	Knowledge of mixed typed research methodology	5	N/A
6	Explain sampling methods and techniques for both quantitative and qualitative strands of research.	6	Explained sampling methodology and chosen sampling size for both quantitative and qualitative strands of research	6	Reference books and articles on research random and purposive sampling methods	6	Knowledge of random and purposive sampling methods and techniques for research	6	N/A
7	Explain data collection methods and techniques for both quantitative and qualitative strands of research	7	Explained data collection method through qualitative and qualitative forms and instruments	7	Reference books on both quantitative and qualitative research methods, surveys, scales, Voice recorder, Camera, Computers, Laptop, Software	7	Knowledge of using voice recorder and video, verbatim transcript, qualitative and statistical software	7	Ensure your personal safety when travelling to and from the research site and make sure that someone you can trust knows where you will be collecting data.
8	Explain reliability and validity of the research for both quantitative and qualitative strands of research	8	Followed steps to ensure reliability and validity of the study for both quantitative and qualitative strands of research	8	Reference books on quantitative and qualitative research validity and reliability, qualitative data analysis and quantitative data analysis software	8	Knowledge of how to supply reliability and validity of the research for both quantitative and qualitative strands of research	8	Guarantee objectivity of measuring instruments, reliability and validity for both quantitative and qualitative strands of research, anonymity of the participants, obtain participants' written consent
9	Report ethical process for both quantitative and qualitative strands of research	9	Accurately reported ethical procedures (e.g. Avoided plagiarism, formal permissions, institutional Review Board (IRB) approval guaranteed anonymity of the participants, obtained participants' written consent)	9	Ethical regulations by the committee of the **institutions** you worked for, Plagiarism Detection Software	9	Using Plagiarism Detection Software to avoid plagiarism, preparing consent form for individual and focus group interviews	9	Keep data securely until destroyed
10	Analyze the data for both quantitative and qualitative strands of research	10	Organized data in terms of average scores in quantitative strand and categorically and chronologically, reviewed repeatedly and continually coded in qualitative strand by determining priority, timing, mixing and the level of interaction between the quantitative and qualitative strands either independently or interactively	10	Reference books on quantitative and qualitative research methods, questionnaires, scales, transcripts, qualitative software, statistical software	10	Knowledge of preparing questionnaires, scales, organizing experimental design, semi-structured preparing interview forms, observation forms and documents related to research topic, collecting and analyzing both artificial and real life documents	10	N/A
11	Discuss the findings for both quantitative and qualitative strands of research	11	Discussed findings using main topics according to how data are collected: experiments, questionnaires, scales and tests in quantitative strand and individual interviews, focus group interviews, observations and documents in qualitative strand.	11	Tests, questionnaires, scales in quantitative strand and transcripts, observation notes and documents in qualitative strand	11		11	N/A
12	Summarize and conclude	12	Outlined why this study is done and its implications	12	The results of whole manuscript	12	Analytical thinking, critical thinking	12	N/A
13	Report recommendations	13	Reported recommendations both for practitioners and researchers	13	The results of whole manuscript	13	Doing research with new ideas, taking charge of his or her ideas	13	N/A
14	Write references and add appendices	14	Ordered references systematically and consistently and kept appendices for outer reliability	14	Reference books, articles, dissertations and forms	14	Consistent and well organized references	14	N/A

APPENDIX 1 Duty/Task: SCID for a MMR-DACUM (Con't.)

WORKER BEHAVIORS (Important to Worker Success)		DECISIONS (Identify Decisions that Must be Made by the Worker)		CUES (Identify the Data Needed for Making Correct Decisions)		ERRORS (Indicate What May Result if Incorrect Decisions are Made)	
1	Expert and professional	1	What is the correct and comprehensive title for the research?	1	Research aim	1	The title does not reflect the whole manuscript and does not make a sense
2	Goal driven	2	What and how many key words should I use to reflect the entire research?	2	Search data bases of research field	2	Key words do not reflect the whole manuscript and does not make a sense
3	Hard working, patient, dedicated to finish long-term projects, self-motivated	3	Which reference books, articles, dissertations should I review? Which scientific search engines should I use?	3	Review data bases of research field related to your research aim carefully to contribute the research field	3	Literature does not support your research aim and research questions. Readers do not understand why you do this research and what contribution you do to research field
4	Detail oriented, flexible, goal driven	4	Which and how many research questions should I write for both quantitative and qualitative strands of research to reach the aim of the research?	4	Experience, review the literature related to research topic	4	The data you collected, and your findings may not answer the research questions and keep you away from the research aim
5	Flexible	5	Which mixed typed design should I choose? Why?	5	Experience and reference book suggestions of mixed typed research methods	5	The design you choose does not comply with your research aim and you may mislead readers who are studying on it
6	Proactive	6	Which random and purposive sampling methods and techniques should I choose? Why?	6	Experience and reference book suggestions of quantitative and qualitative research methods	6	The data you collected from the sampling do not support your aim and may mislead you
7	Cautious, punctual, good listener	7	How should I collect data? What materials should I use to collect data? How should I ensure my personal safety?	7	Experience, rely on both the results of objective data collection methods by focusing on measuring and the results of subjective data methods by focusing on the participants' thinking, supply triangulation	7	You lose both the objectivity of measuring instruments and your objectivity and thus the results may mislead others, and your biases may mislead you
8	Trustworthy, professional, careful	8	What should I do to support reliability and validity of for both quantitative and qualitative strands of the research?	8	Do pilot study for reliability and validity of the study for both quantitative and qualitative strands	8	Your manuscript submitted to a journal can be rejected due to poor reliability and validity
9	Ethical Reliable, safety- oriented	9	What steps should I follow to conform to the ethics committee of social science research?	9	Keep up with the steps in the ethical regulations form of the ethical committee and get ethical approval before doing your research	9	Bad reputation and you do your research in vain
10	Detail oriented, open-minded	10	Where and how should I mix the quantitative and qualitative strands while analyzing the findings? How should I code quantitative data in term s of numbers and qualitative data in terms of main themes and sub themes? Which quantitative analysis (t- test, anova, regression etc.) and qualitative analysis (thematic, descriptive, content) should I use?	10	Focus on scores as a result of experiments, scales and questionnaires in quantitative strand and participant views in transcript, participant observation notes and documents in qualitative strand Take interaction, timing, priority and mixing of qualitative and quantitative data into consideration while analyzing the findings?	10	You lose nomothetic characteristic of quantitative data or ideographic characteristic of qualitative data
11	Accurate and objective	11	Where and how should I mix the quantitative and qualitative strands while discussing the findings? Which findings should I take priority and discuss analytically?	11	Take interaction, timing, priority and mixing of qualitative and quantitative data into consideration while discussing the findings. Focus on which of your findings contribute to the research literature you are working on and what are the similarities and difference between your research and studies done so far	11	You cannot contribute to relevant research literature
12	Open minded	12	Which significant conclusion should I write?	12	Focus on significant conclusion consistent with your findings?	12	Readers who has a quick look to review literature may have no idea on your research and do not cite your research
13	Adaptable	13	Which recommendations should I put forward both for practitioners and researchers?	13	Suggest attractive and innovative recommendations consistent with your findings	13	Your published manuscript may not influence prospective researchers, and you cannot lead them and you cannot be a familiar scientist in your own field
14	Accurate and careful	14	How should I organize references (number or alphabetical order? Which journal should I submit my manuscript?	14	Take care of author guidance of the journal you will submit for publication and its manuscript writing guidelines	14	Rejection of the manuscript by the reviewers and editors of a journal

Source: Adapted by Gunbayi (2020).