KEMENTERIAN PENDIDIKAN
INSTITUT PENDIDIKAN GURU MALAYSIA

SCES3283: FUNDAMENTALS OF RESEARCH IN SCIENCE EDUCATION

SURVEY RESEARCH

PROGRAM IJAZAH SARJANA MUDA PERGURUAN
SAINS PENDIDIKAN RENDAH

INSTITUT PENDIDIKAN GURU MALAYSIA
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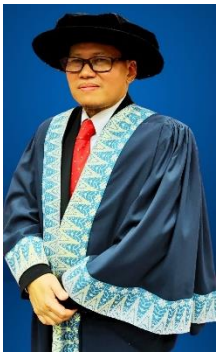
CONTENT

CONTENT

LIST OF APPENDICES

LIST OF ABBREVIATIONS

APA	American Psychological Association
IPGMK	Institut Pendidikan Guru Malaysia Kampus
IPGM	Institut Pendidikan Guru Malaysia
MOE	Ministry of Education Malaysia
MK	Maklumat Kursus (Course Information)



PREFACE
RECTOR
INSTITUT PENDIDIKAN GURU MALAYSIA

Assalamualaikum w.b.t

Salam Malaysia MADANI

Salam IPGM … Peneraju Kecemerlangan Pendidikan Guru Bertaraf Dunia.

Praise be to Allah for His guidance and blessings, which have enabled us to embark on the noble endeavour of producing the Research Implementation Guidebook for the Malaysian Teacher Education Institute. This comprehensive guide stands as a testament to our commitment to fostering research practices that elevate the professionalism of future educators.

The implementation of research is a pivotal aspect of enhancing teacher professionalism, serving as a means to acquire empirical evidence. This allows us to scientifically study problems and continually evaluate, improve and fortify decision-making processes and practices. The guidebook serves as a compass for students at the Institute of Teacher Education in Malaysia, guiding them through a correct, accurate and systematic research process that yields meaningful findings.

In our roles as educators, administrators and researchers, we acknowledge the importance of addressing the myriad challenges faced by schools. Through diligent research, we aim to tackle these issues and contribute positively to planned changes. The impact of our findings is anticipated to align with educational goals, keeping pace with rapid advancements in science, technology and information and computer technology.

This handbook underscores the significance of showcasing best practices in teaching and learning. It provides a framework for highlighting effective methodologies and strategies that can be implemented to enhance the overall educational experience.

I extend my heartfelt gratitude to the Director of the Malaysian Institute of Teacher Education, Penang Campus, for their visionary leadership in championing this initiative. Special appreciation is extended to the dedicated panel of writers who have tirelessly contributed to the success of this guidebook. Their commitment reflects a shared vision for advancing the quality of research writing in the field of science education.

This publication transcends being a mere guide as it is a tool designed to assist students in achieving the desired learning outcomes of their programme. The standards outlined in this guidebook aim to elevate scientific writing, promoting equivalent excellence across all campuses of the Teacher Education Institute.

I am confident that the utilisation of this standard research writing guide will empower lecturers to plan learning experiences that enhance the quality of research writing among students. It is our collective hope that this effort will contribute to the continuous improvement of the excellence and quality of national education.

In conclusion, I express sincere appreciation and gratitude to all those who have dedicated their time, energy, and imagination to bring this guidebook to fruition. May Allah SWT bless their sacrifices and efforts as we strive together to improve the educational landscape of our beloved nation.

DR. MOHD AZAM BIN AHMAD
RECTOR IPGM

PREFACE
DIRECTOR
INSTITUTE OF TEACHER EDUCATION PULAU PINANG CAMPUS

Greetings and Assalamualaikum wbt,

I express my gratitude to Allah S.W.T. for the successful publication of the Institute of Teacher Education (IPG) Science Research Handbook for the Bachelor of Teaching Programme (PISMP) intake in June 2021/2026. Congratulations to all members of the Research Handbook committee.

I extend my deepest appreciation to the lecturers whose knowledge and wisdom have contributed to the publication of this Research Handbook. It not only contains the latest information in science research but also serves as a valuable guide for all science lecturers at the Institute of Teacher Education (IPG). Together, we are charting a new direction in research, creating a space for academic excellence, and contributing to the global education landscape by empowering education and internationalisation through research.

The success demonstrated by the lecturers in producing this book reflects the quality and excellence of our institution in the development of academic fields, particularly in research. May this Research Handbook serve as a source of inspiration for teachers and lecturers in the pursuit of academic excellence. This effort aligns with IPG's initiative to transform the research field, evident in the department's research support rating.

In conclusion, I would like to express my gratitude to all parties involved, especially the lecturers who contributed brilliant ideas to the production of this Research Handbook. The collective collaboration of all parties is an earnest effort to strengthen science research, in line with the Ministry of Education's aspiration to empower STEM education.

Thank you.

DR. AZMAN BIN JUSOH
DIRECTOR
IPGM PULAU PINANG CAMPUS
TIER 1 SCIENCE EDUCATION

INTRODUCTION

In line with the MOE's aspiration to make IPG a world-class teacher education institution, research standards also need to be improved. IPG students need to be exposed to different types of research rather than just action research. From 2024, four types of research design are introduced in the course Fundamentals of Research in Science Education and Research in Science Education - Project Paper. The four types of research design are survey research, experimental/quasi-experimental research, case studies and action research. Students are given more opportunity to explore their desired areas of research. All four research designs are scientific processes that involve collecting, processing, testing and interpreting data to the point of drawing conclusions using specific methods and techniques to find solutions or answers to issues related to education. Generally, the function of such educational research is to develop educational knowledge, solve educational problems and study the development of national education. Through such educational research, teachers as educational practitioners have the opportunity to improve teaching and learning practices as well as improve their professionalism. In this regard, this research handbook is written for the use of basic research courses for the IPG PISMP programme. This handbook aims to help lecturers and students manage the implementation and evaluation of continuous assessment for this course in a planned, systematic and quality manner.

Rationale and Goals

This research handbook is a guide to optimise implementation and reporting standards across the IPGM campus. This handbook provides a guide to four types of research design that can be implemented at IPGM campus. They are survey research, experimental/quasi-experimental research, case studies and action research. Similarly, this handbook aims to facilitate the supervisor to guide and supervise the conduct of research selected by the student according to the relevant field of study. This handbook also aims to ensure consistency of concepts and formats in conducting and producing educational research.

Objectives

1. Produce a system that controls quality for writing a sound research report.
2. Enhance the validity and reliability of the research related to the selected research design.
3. Refine the format and arrangement of research proposal and presentation of research proposal.
4. Standardise the implementation of research for this course.

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A RESEARCH ETHICS

In conducting research, researchers must comply with the rules and ethics of research (Chua, 2014; Creswell, 2022).

The following are ethics in investigation:

1. Distinctive rights

   The researcher should not force a person to engage in a research. A letter of consent must be obtained from the parent/guardian if the child is involved in the research.

2. Right not to be recognised

   The researcher is considered unethical if the researcher reports the findings of individual-based research, especially if the identity is also reported.

3. Right of confidentiality

   The right of confidentiality is intended to safeguard the integrity of the research participants/respondents while ensuring that the research participants are not mistreated or harmed. Among the methods that researchers often use to guarantee the right of confidentiality are:

   a. Using a code system that is not a real name.

   b. Destroying research protocols such as questionnaires that have been processed when the research has been completed.

   c. Using self-stamped letter cover for the purpose of returning the completed questionnaires.

4. Responsibilities of the researcher

   The researcher is solely responsible for any implications that occured to the research participants/respondents involved in the research. Researchers must be responsible for their research.

5. Avoid physical or mental injury of research participants

   The welfare of each individual involved in research should be given the utmost consideration and attention. In conducting research, protect research participants/respondents from being exposed to any possibility that could cause them physical harm or be emotionally or mentally disturbed.

6. Avoid lying to research participants

   Lying can cause research participants / respondents to believe things that are not true. Lies that are carried out may be active (lying) or passive (hiding something from the knowledge of research participants / respondents. Both of these lies are wrong in terms of research ethics.

7. Plagiarism

   Plagiarism occurs if a researcher takes or uses the ideas or work of others without giving credit or getting permission.

8. Falsify or keep the data secret

   The researcher needs to report honestly all data to develop knowledge or gain new knowledge. If the researcher modifies the data to get the desired results, this action not only restricts the progress of knowledge but can also have negative implications for the research participants/respondents involved.

B FORMAT FOR WRITING SURVEY RESEARCH PROPOSAL

The writing of the research proposal (2000 words) consists of four main sections, namely the cover page, preliminary pages, text, and appendices.

Format for writing survey research proposal is as follows:

COVER PAGE

PRELIMINARY PAGES

Content
List of Tables
List of Figures
List of Abbreviations
List of Appendices

TEXT

TITLE

CHAPTER 1.0: INTRODUCTION

1.1 Background
1.2 Problem Statement
1.3 Research Purpose
  1.3.1 Research Objectives
  1.3.2 Research Questions
  1.3.3 Research Hypotheses
1.4 Conceptual Framework
1.5 Scope and Limitation
1.6 Research Significance
1.7 Operational Definition
1.8 Summary

CHAPTER 2.0: LITERATURE REVIEW

2.1 Introduction
2.2 Research Theory/Model
2.3 Previous Research Findings
2.4 Summary

C GUIDELINES FOR WRITING SURVEY RESEARCH PROPOSAL

Cover Page

The cover should contain the following which is the title (written in capital letters, Arial 14 and bold font size), student name, programme, intake, supervisor's name, IPGM Kampus and year of submission of research proposal paper (APPENDIX A). The front page of the action research proposal should use regular A4 paper (80 gm).

Preliminary page

The preliminary section consists of five small parts that need to be included in the research proposal. Each page in the preliminary section is labelled using Roman numbers. The pages of each page are labelled using Roman numbers. Among the sections are:

- CONTENT
- LIST OF TABLES
- LIST OF FIGURES
- LIST OF ABBREVIATIONS
- LIST OF APPENDICES

Content

The content page should be started on a new page and contain two components, namely the title and the page.

List of Tables

All the tables contained in the proposal paper are listed in this page. Among the information listed are table number, table name, and table page.

List of Figures

All the figures included in the research proposal are listed on this page. Among the information listed are figure number, figure name, and figure page.

List of Abbreviations

This page lists all the abbreviations and full names used in writing. This section consists of three components, namely abbreviations, descriptions and pages.

List of Appendices

This page lists all the study-related materials attached in the proposal paper. Typically, the attached material consists of permission letters, questionnaires, related photographs, etc. (For example: Appendix C: Research Questionnaire).

Text

Text writing skipped 1.5 using Arial font 12. The content in the text includes the following points:

TITLE

The title should not exceed 15 words. The title should summarize the main idea of the research. It should be as short as possible while adequately describing the purpose and/or content of the research. Vague and very long titles should be avoided.

Example of study title:

- The relationship between science process skills and student achievements in Science.
- The role of extra-curricular activities in increasing student interest in Science and STEM careers.
- Interests and perceptions of students in Science.

CHAPTER 1.0: INTRODUCTION

Chapter 1.0 contains eight sections as follows:

1.1 BACKGROUND

Describe a comprehensive picture of the main topic/field of study clearly, accurately and interestingly. The introduction contains backgrounds that discuss the problems/situations that arise to be studied as well as the ability to manifest the problem and the importance of being researched. The introduction provides an overview of the problems/situations of interest as well as the related variables provided by the literature.

1.2 PROBLEM STATEMENT

The problem statement is clearly stated with the support of the latest literature and is appropriate in relation to the current issue. The weaknesses/problems/constraints faced/information gaps in the area of interest should be elaborated. The problem statement should also describe clearly and in detail the main variables of the study in connection with the issue/problem of interest.

1.3 RESEARCH PURPOSE

The purpose should clearly express the aims of the research as well as the variables and sample of interest.

Examples of research purpose:

- This study was conducted to explore the relationship between Year 5 students' science process skills and their achievements in Science.
- The study was conducted to examine the role of extra-curricular activities in increasing the interest of STEM Society members in Science and STEM careers.
- The study was conducted to examine the interests and perceptions of Year 5 students in science.

1.3.1 RESEARCH OBJECTIVES

Objectives are specific, measurable and achievable statements. A good objective is to use the word behavior. The features of writing a good study objectives are:

- Relevant, achievable, clear, logical, measurable and appropriate to the study method
- Describes the value of the relationship/ difference, contribution or effect of interaction between the studied variables (quantitative)
- Describing the exploration towards understanding (qualitative)

Examples of research objective:

- To identify the relationship between science process skills and student achievements in Science.
- To assess the role of extra-curricular activities in increasing student interest in Science and STEM careers.
- To compare the interests and perceptions of male and female students in Science.

1.3.2 RESEARCH QUESTIONS

The research questions are written in the clear, focused and coherent manners to answer the objectives of the study. They are constructed based on the reearch problem to assist researchers in achieving the research objectives.

Examples of research questions:

- What is the relationship between science process skills and student achievements in Science?
- Do extra-curricular activities increase student interest in Science and STEM careers?
- Is there a difference between male and female students in their interests and perceptions of Science?

1.3.3 RESEARCH HYPOTHESES

Hypothesis is a predictive statement that can be tested and constructed on appropriate and sound evidence-based assumptions or theories. The hypothesis describes the relevance/relationship/ expected difference between two or more variables clearly and in parallel with the problem statement.

Examples of research hypothesis :

- Null hypothesis:
  There is no significant relationship between science process skills and students' achievement in Science.

  Alternative Hypothesis:
  There is a significant relationship between science process skills and students' achievement in Science.

- Null hypothesis
  There is no significant difference between male and female students in their interests in Science and STEM careers.

  Alternative Hypothesis
  There is a significant difference between male and female students in their interests in Science and STEM careers.

Remember that the null hypothesis states no significant effect or difference, while the alternative hypothesis states the presence of a significant effect or difference. When conducting a statistical analysis, researchers typically try to reject the null hypothesis to support the alternative hypothesis if there is sufficient evidence.

1.4 CONCEPTUAL FRAMEWORK

The conceptual framework of a research an elucidation of the research model. It can also specify the variables involved and the relationships among them. The concept framework is usually illustrated in the form of a diagram containing arrows as well as a clear and dense visual description to give an idea of the relevance between each variable and supported with appropriate literature.

1.5 SCOPE AND LIMITATIONS

The scope of research refers to the boundaries or limits set for a particular research. It defines the extent and range of the research, outlining what aspects will be included and excluded. The scope helps researchers focus on specific objectives, questions, or hypotheses within a defined area. It often encompasses the subjects, time frame, geographic location, and other relevant parameters that delineate the study's boundaries. A well-defined research scope is crucial for maintaining clarity and ensuring that the research remains manageable and feasible within given constraints.

Research limitations refer to the constraints or shortcomings that affect the design, execution, or interpretation of a research study. These limitations highlight the boundaries and restrictions within which the research is conducted, and they may arise from various factors. The limitations of the research include the possibility of weaknesses that are out of control such as involving variables in the study methodology i.e. non-randomized sample selection, study sample bias, small sample size, external variable effects, etc.

1.6 RESEARCH SIGNIFICANCE

Research significance refers to the importance, relevance, and meaningfulness of the research. It encompasses the contributions, implications, and potential impact that the research may have on the field of study, as well as on practical applications, policies, or society as a whole. Identifying the significance of a research is crucial for justifying the effort, resources, and time invested in the research.

1.7 OPERATIONAL DEFINITION

An operational definition is a clear, precise, and specific explanation of how a variable will be measured, observed, or manipulated in a research. It translates abstract or theoretical concepts into concrete and measurable terms, allowing researchers to standardize procedures and ensure consistency in data collection and analysis.

1.8 SUMMARY

Summarise the main points discussed in this chapter.

CHAPTER 2.0: LITERATURE REVIEW

The literature review is a critical component that showcases the depth of the researcher's understanding of the field and provides a foundation for the research that follows. It contains the discussion of the results of reading analysis on the field of study in depth, important concepts/principles as well as related theories and models and shows the relevance of the findings and methods used in previous research. An effective literature review is more than just a summary of existing studies; it is a critical analysis that contributes to the theoretical and methodological foundations of the research.

Chapter 2.0 contains at least four sections as follows:

2.1 INTRODUCTION

Describe and discuss each research variable in detail based on literature review. Provides early identification to dependent and independent variables in the context of the research.

2.2 RESEARCH THEORY/MODEL

Theories or models that are relevant and closely related to the problem statement and become the basis for the basis of the study / scope of study are explained clearly and comprehensively.

2.3 PREVIOUS RESEARCH FINDINGS

The findings of past studies (not exceeding 10 years) which are relevant to the field of research should be clearly, concisely and critically analyzed. The information in the literature review is synthesized and formulated based on a variety of authentic and relevant scholarly sources.

2.4 SUMMARY

Summarise the main points discussed in this chapter.

CHAPTER 3.0: METHODOLOGY

The reserach methodology is the means, methods and approaches used to design, collect and analyze data in order to achieve research. The methodology outlines the course of systematic procedure of the research through organized methods to obtain objective evidence in relation to research objectives.

Chapter 3.0 contains at least nine sections as follows:

3.1 INTRODUCTION

Briefly describe the content of this chapter.

3.2 RESEARCH DESIGN

Justification of using survey research should be explained. The description of the research procedure involving all related variables should be elaborated.

3.3 SAMPLING

The sampling procedure needs to be explained in detail, particularly concerning aspects such as how the samples represent the population, the sample size and the method of subject selection, whether random or not. The sampling method must be appropriate for the research design used, and the justification for selecting the sampling method should be logically and thoroughly stated.

3.4 RESEARCH INSTRUMENTS

The measurement tools used to collect data on the relevant variables should be explained in detail. The instrument should be described accurately and in-depth, meeting the characteristics of a good instrument. This includes the type of instrument, components within the instrument, ease of administration, ease of interpretation and objectivity. This section should also provide accurate and detailed explanations on how the instrument was derived or developed.

3.5 VALIDITY AND RELIABILITY

The face validity and content validity of the study instruments are discussed clearly. The validation procedure must be clear, correct and consistent with the design of the study. The reliability of the study instrument is discussed clearly. The procedures for obtaining credibility are described in detail, correct and comply with the design of the study.

3.6 PILOT STUDY

Describe the procedure of performing pilot study. Information on the suitability of the selected pilot test sample, the weaknesses found and the improvement of the instrument should be clarified.

3.7 DATA COLLECTION

Data collection methods in accordance with the objectives, questions and hypotheses of the study are explained in detail, including the Study Implementation Schedule (Gantt Chart).

3.8 DATA ANALYSIS

The analysis of data collected involves coding, data input processes, addressing missing values, outliers, extreme values, assumptions of inferential statistics, and the normal distribution of data. Preliminary analysis of qualitative data involves coding, categorization, and theme identification. The data analysis method should align with the research objectives, research questions/hypotheses, and the research design. The choice of data analysis methods should also be appropriate for the type of instrument and the scale of measurement used.

3.9 SUMMARY

Summarise the main points discussed in this chapter.

REFERENCE

Provide at least 15 references from various sources including reliable journals, books and online sources. Most references to past studies should not exceed 10 years and the reference format should comply with the latest *American Psychological Association* (APA) reference style.

APPENDICES

Appendices should correspond to the research conducted and systematically compiled as the following examples:

Appendix A: Research Consent Letter

Appendix B: Gantt Chart

Appendix C: Research Instruments

Other relevant appendices should be included based on the requirements of the research.

Level Criteria	**OUTSTANDING (Marks) 13.5 - 15.0**	**EXCELLENT (Marks) 11.5 - 13.4**	**GOOD (Marks) 9.0 - 11.4**	**SATISFACTORY (Marks) 7.5 - 8.9**	**WEAK (Marks) < 7.5**
COGNITIVE SKILLS PLO2 (45%)					
INTRODUCTION (15 marks) Background	Demonstrate outstanding comprehension on the overview of the main topic/field of study in a clear, accurate and interesting way and is well supported by literature.	Demonstrate excellent comprehension on the overview of the main topic/field of study in a clear and accurate way and is supported by literature.	Demonstrate good comprehension on the overview of the main topic/field of study and is supported by literature.	Demonstrate satisfactory comprehension on the overview of the main topic/field of study and is supported by limited literature.	Demonstrate poor comprehension on the overview of the main topic/field of study and is not supported by relevant literature.
Problem Statement	Able to provide outstanding elaboration on the problem/issue of interest with up-to-date literature support and is very relevant to the current scenario and the information gap that needs to be researched.	Able to provide excellent elaboration on the problem/issue of interest with up-to-date literature support and is relevant to the current scenario and the information gap that needs to be researched.	Able to provide good elaboration on the problem/issue of interest with sufficient literature support and is relevant to the current scenario and the information gap that needs to be researched.	Able to provide satisfactory elaboration on the problem/issue of interest with limited literature support and lacks relevance to the current scenario.	Unable to provide satisfactory elaboration on the problem/issue of interest and lacks the literature support.
Research Purpose	Able to explain the main purpose of the study very clearly with sufficient information	Able to explain the main purpose of the study clearly with sufficient information.	Able to explain the main purpose of the study clearly with limited information.	Able to explain the main purpose of the study satisfactorily but lacks relevant information	Unable to explain the main purpose of the study clearly, lacks basic information.

Level Criteria	**OUTSTANDING (Marks) 13.5 - 15.0**	**EXCELLENT (Marks) 11.5 - 13.4**	**GOOD (Marks) 9.0 - 11.4**	**SATISFACTORY (Marks) 7.5 - 8.9**	**WEAK (Marks) < 7.5**
Conceptual Framework	Able to construct a comprehensive framework in the form of a very clear diagram of the relationship between variables supported with relevant literature.	Able to construct a comprehensive framework in the form of a clear diagram of the relationship between variables supported with relevant literature.	Able to construct a general diagram of relationships between variables supported with relevant literature.	The constructed framework indicates inaccurate links between variables and is not supported with relevant literature.	Unable to construct a framework to link the relevant variables.
Research Objectives & Research Questions	Able to write research objectives and research questions very clearly and precisely and meet all the characteristics of objective writing and research questions.	Able to write research objectives and research questions clearly and precisely and meet all the characteristics of objective writing and research questions.	Able to write research objectives and research questions quite clearly and meet most of charcteristics of writing objectives and research questions.	Able to write research objectives and research questions in general and fulfills some characteristics of objective writing and research questions.	Unable to write research objectives and research questions comprehensibly and does not meet the characteristics of objective writing and research questions.
Hypothesis	Able to make outstanding statements that can be tested and built on assumptions that are based on recent and relevant evidence or theories.	Able to make excellent statements that can be tested and built on assumptions that are based on relevant evidence or theories.	Able to make good statements that can be tested and built on assumptions that are based on evidence or theories.	Able to make satisfactory statements that can be tested but lacks theoretical assumptions.	Unable make statements that can be tested.

Level Criteria	**OUTSTANDING (Marks) 13.5 - 15.0**	**EXCELLENT (Marks) 11.5 - 13.4**	**GOOD (Marks) 9.0 - 11.4**	**SATISFACTORY (Marks) 7.5 - 8.9**	**WEAK (Marks) < 7.5**
Scope and Limitation	Able to provide very precise, clear and justified ideas on the scope and limitations of the study.	Able to provide precise, clear and justified ideas on the scope and limitations of the study.	Able to provide precise and clear ideas on the scope and limitations of the study.	Able to provide satisfactory ideas on the scope and limitations of the study.	Unable to provide sufficient ideas on the scope and limitations of the study.
Research Significance	Able to explain the importance of the study on education and the field of interest in a very precise, detailed and clear manner.	Able to explain the importance of the study on education and the field of interest in a precise and clear manner.	Able to explain the importance of the study on education and the field of interest quite accurately.	Able to provide satisfactory explanation on general importance of the study on education.	Unable to provide explanation on the importance of the study on education.
Operational Definition	Able to define all variables/terms in the study.very clearly and accurately.	Able to define all variables/terms in the study.clearly and accurately.	Able to define most variables/terms in the study clearly.	Able to define some variables/terms in the study clearly.	Unable to define variables/terms in the study.
LITERATURE REVIEW (15 marks) Introduction	Able to discuss information about the background of each variable in the context of the study very clearly and in detail.	Able to discuss information about the background of each variable in the context of the study clearly.	Able to discuss most of the information about the background of each variable in the context of the study clearly.	Able to discuss some of the information about the background of each variable in the context of the study.	Unable to discuss variables in the context of the study.
Research Theory/Model	Able to discuss theory/model very clearly, comprehensively and closely related to the problem statement.	Able to discuss theory/model clearly and matched with the problem statement.	Able to discuss theory/model clearly but not matched with the problem statement.	Able to discuss theory/model less clearly and less compatible with the problem statement.	Unable to discuss theory/model related to the problem statement.

Level Criteria	**OUTSTANDING (Marks) 13.5 - 15.0**	**EXCELLENT (Marks) 11.5 - 13.4**	**GOOD (Marks) 9.0 - 11.4**	**SATISFACTORY (Marks) 7.5 - 8.9**	**WEAK (Marks) < 7.5**
Previous Research Findings	Able to synthesize and summarize information very clearly, comprehensively and critically in the literature review based on a variety of valid and highly relevant sources.	Able to synthesize and summarize information clearly, comprehensively, and critically in the literary review based on a variety of valid sources.	Able to summarize but not synthesize information clearly and critically in the literary review based onf a variety of valid sources.	Able to summarize information less clearly and less critically in the literature review but not from the valid sources.	Unable to summarize information clearly in the literature review and not referring to the valid sources.
METHODOLOGY (15 marks) Introduction	Able to provide very clear brief introduction about research methodology.	Able provide clear brief introduction about research methodology.	Able to provide satisfactory brief introduction about research methodology.	Able to provide some information about research methodology.	Unable to provide brief introduction about research methodology.
Research Design	The justification for the selection of research design is very accurate and clear.	The justification for the selection of research design is accurate and clear.	The justification for the selection of study design is clearly outlined.	The justification for the selection of study design is outlined less clearly.	The justification for the selection of study design is not clearly explained.
Sampling	The method of sampling and justification of selection is elaborated very accurately, clearly and in detail.	The method of sampling and justification of selection is accurately and clearly described.	The method of sampling and justification of selection is well described.	The method of sampling and justification of selection is partially accurate.	The method of sampling and justification of selection are poorly described.

Level / Criteria	OUTSTANDING (Marks) 13.5 - 15.0	EXCELLENT (Marks) 11.5 - 13.4	GOOD (Marks) 9.0 - 11.4	SATISFACTORY (Marks) 7.5 - 8.9	WEAK (Marks) < 7.5
Research Instrument	Provide very accurate and detailed explanations on how the instrument was derived or developed.	Provide accurate and detailed explanations on how the instrument was derived or developed.	Provide good explanations on how the instrument was derived or developed.	Provide satisfactory explanations on how the instrument was derived or developed.	Unable to provide satisfactory explanations on how the instrument was derived or developed.
Validity & Reliability	The procedure to establish validity and reliability of the research instrument is very clearly discussed.	The procedure to establish validity and reliability of the research instrument is clearly discussed.	The procedure to establish validity and reliability of the research instrument is sufficiently discussed.	The procedure to establish validity and reliability of the research instrument is satisfactorily discussed.	The procedure to establish validity and reliability of the research instrument is not discussed satisfactorily..
Pilot Study	The pilot study is carried out with minimum 30 respondents. Necessary ammendments made to improve the research instrument are very clearly explained.	The pilot study is carried out with minimum 30 respondents. Necessary ammendments made to improve the research instrument are clearly explained.	The pilot study is carried out with minimum 30 respondents. Necessary ammendments made to improve the research instrument are clearly explained.	The pilot study is carried out with less than 30 respondents. Insufficient ammendments are made to improve the research instrument.	The pilot study is carried out with less than 30 respondents. No ammendments are made to improve the research instrument.

Level Criteria	**OUTSTANDING (Marks) 13.5 - 15.0**	**EXCELLENT (Marks) 11.5 - 13.4**	**GOOD (Marks) 9.0 - 11.4**	**SATISFACTORY (Marks) 7.5 - 8.9**	**WEAK (Marks) < 7.5**
Data Collection	The data collection method is highly relevant to the research question and the purpose of the research.	The data collection method is mostly relevant to the research question and the purpose of the research.	The data collection method is somewhat relevant to the research question and the purpose of the research.	The data collection method is marginally relevant to the research question and the purpose of the research.	The data collection method is irrelevant to the research question and the purpose of the research.
Data Analysis	The data are analyzed thoroughly and rigorously. The analysis is appropriate and well justified. The analysis is logical, coherent, and supported by evidence.	The data are analyzed thoroughly and reasonably. The analysis is appropriate and somewhat justified. The analysis is logical and coherent, but some evidence is missing or weak.	The data are analyzed adequately and reasonably. The analysis is appropriate but not well justified. The analysis is logical and coherent, but some evidence is missing or weak.	The data are analyzed poorly or inappropriately. The analysis is inappropriate or poorly justified. The analysis is illogical, incoherent, or unsupported by evidence.	The data are not analyzed or irrelevantly analyzed. The analysis is missing or irrelevant. The analysis is illogical, incoherent, or unsupported by evidence.

Level Criteria	OUTSTANDING (Marks) 4.5 – 5.0	EXCELLENT (Marks) 3.8 – 4.4	GOOD (Marks) 3.0 – 3.7	SATISFACTORY (Marks) 2.5 – 2.9	WEAK (Marks) <2.5
ETHICS AND PROFESSIONALISM PLO11 (5%)					
WRITING STYLE & REFERENCING (5 marks) **Writng Style**	The writing is clear, concise, and engaging. The tone, voice, and vocabulary are appropriate for the audience, purpose, and discipline. The writing is free of errors in grammar, spelling, and punctuation.	The writing is clear, concise, and mostly engaging. The tone, voice, and vocabulary are mostly appropriate for the audience, purpose, and discipline. The writing has few errors in grammar, spelling, and punctuation.	The writing is clear and concise, but not very engaging. The tone, voice, and vocabulary are somewhat appropriate for the audience, purpose, and discipline. The writing has some errors in grammar, spelling, and punctuation.	The writing is clear, but not concise or engaging. The tone, voice, and vocabulary are not always appropriate for the audience, purpose, and discipline. The writing has many errors in grammar, spelling, and punctuation.	The writing is unclear, wordy, and dull. The tone, voice, and vocabulary are inappropriate for the audience, purpose, and discipline. The writing has numerous errors in grammar, spelling, and punctuation.
Referencing	The referencing is consistent, accurate, and follows the required style. All sources are relevant, credible, and properly cited. The reference list is complete and formatted correctly.	The referencing is consistent, accurate, and mostly follows the required style. Most sources are relevant, credible, and properly cited. The reference list is mostly complete and formatted correctly.	The referencing is consistent, accurate, and partially follows the required style. Some sources are relevant, credible, and properly cited. The reference list is partially complete and formatted correctly.	The referencing is inconsistent, inaccurate, and does not follow the required style. Few sources are relevant, credible, and properly cited. The reference list is incomplete and formatted incorrectly.	The referencing is missing, incorrect, or irrelevant. No sources are relevant, credible, or properly cited. The reference list is missing or formatted incorrectly.

Level Criteria	OUTSTANDING (Marks) 9.0 – 10.0	EXCELLENT (Marks) 7.5 – 8.9	GOOD (Marks) 6.0 – 7.4	SATISFACTORY (Marks) 5.0 – 5.9	WEAK (Marks) < 5.0
COMMUNICATION SKILLS PLO5 (10%)					
Presentation (10 marks)	Able to deliver an outstanding presentation of research proposal and answer questions clearly, coherently, confidently and convincingly	Able to deliver an excellent presentation of research proposal and answer questions clearly, coherently, confidently and convincingly	Able to deliver a good presentation of research proposal and answer questions clearly, coherently and confidently	Able to deliver a satisfactory presentation of research proposal and answer questions clearly and coherently	Unable to deliver a satisfactory presentation of research proposal and answer questions
DIGITAL SKILLS PLO6 (10%)					
Utilization of Digital Skills (10 marks)	Able to demonstrate oustanding application of various digital skill, media resources and technology by recognizing digital rights, being responsible and ethical in science education research	Able to demonstrate excellent application of various digital skill, media resources and technology by recognizing digital rights, being responsible and ethical in science education research	Able to demonstrate good application of various digital skill, media resources and technology by recognizing digital rights, being responsible and ethical in science education research	Able to demonstrate satisfactory application of various digital skill, media resources and technology by recognizing digital rights, being responsible and ethical in science education research	Unable to demonstrate satisfactory application of various digital skill, media resources and technology by recognizing digital rights, being responsible and ethical in science education research

F FORMAT FOR WRITING REFERENCES (APA 7th EDITION)

Guide to writing a reference list		
An author	last name/ surname followed by author's initial	Poincaré, H. (2022). *The foundations of science: Science and hypothesis, the value of science, science and method*. DigiCat.
Two authors	Last name/Surname first followed by the first letter of the author's first name. Use the '&' symbol instead of 'and'.	Sheldrake, M., & Wohlleben, P. (2021). *Entangled life: How fungi make our worlds, change our minds & shape our futures*. Random House Trade Paperbacks
Three to twenty authors (List all authors)	Last name/Surname first followed by the first letter of the author's first name; commas separate author names, while the last author name is preceded by the '&' symbol	Kandel, E. R., Schwartz, J. H., Jessell, T. M., Siegelbaum, S., Hudspeth, A. J., & Mack, S. (2020). *Principles of neural science*. McGraw Hill.
More than twenty authors	Enter the list of the first nineteen authors followed by three ellipsis dots (…) in place of the remaining author name. End with the last author's name.	Pegion, K., Kirtman, B. P., Becker, E., Collins, D. C., LaJoie, E., Burgman, R., Bell, R., DelSole, R., Min, D., Zhu, Y., Li, W., Sinsky, E., Guan, H., Gottschalck, J., Metzger, E. J., Barton, N. P., Achuthavarier, D., Marshak, J., Koster, R., . . . Kim, H. (2019). The subseasonal experiment (SubX): A multimodel subseasonal prediction experiment. *Bulletin of the American Meteorological Society*, *100*(10), 2043-2061.
Malay author	Leave out 'bin' or 'binti'	Dato' Ismail Bin Kamus **Referred as** Ismail Kamus. (2010). I*ndahnya amalan doa*. Telaga Biru.
Chinese author	Surname followed by the first letter of the next author's name	Wu Lee Cheng **Referred as** Wu, L.Y.(2019). *Chinese Science Education in the 21st Century : Policy, Practice, and Research*. Springer.
Chinese author with english name	Surname followed by the first letter of the next author's name	Richards Jen Chia Woo **Referred as** Jen, R. C. W., & Pun, J. (2022). Teacher strategies in implementing English medium instruction. *ELT Journal*, *76*(2), 227-237.

Indian & Sikh names	Leave out d/o, s/o, a/l, a/p	Vinod Singh. (2023). Nature of science in preservice science teacher education–Case studies of Irish pre-service science teachers. *Journal of Science Teacher Education*, *34*(2), 201-223.
Inherited names	Use the inherited names	Raja Ahmad Niza **Referred as** Raja Ahmad Niza. (2020). Nature of science in preservice science teacher education–Case studies of Malaysian pre-service science teachers. *Journal of Science Teacher Education*, *34*(2), 201-223.

Guide to writing a reference list		
Awarded title	Leave out titles such as Datuk/Tan/Sri/Tun/ Prof/Dr/Haji	Tun Dr Mahathir Mohamad **Referred as** Mahathir Mohamad
Agency, Association or Institution as author	Use the official full name	**Example** American Psychological Association not APA. Ministry of Education Malaysia not MOE Ministry of Education Malaysia, (2018) *Report of Initiative MEB #49: Strengthen STEM Education 2017*. Minisry of Education Malaysa.
Corporate bodies	Use the official full name	Committee of Bank Rakyat (2020). *Bank Rakyat finance*. Dewan Bahasa dan Pustaka.
Conference	Do not include number	Ninth International Conference on Science and Mathematics Education. (2021). **Referred as** *International Conference on Science and Mathematics Education.* (2021).
Unknown author	Use the title of the article in place of the author's name	Developing deep learning. (2020)
Youtube video	Use the youtube channel name	The science of teaching, effective education, and great schools featured in Sprouts channel (2019) **Referred as** Sprouts. (2019, June 4).
Podcast video	last name/ surname followed by author's initial or The title of the the podcast	Berie, J. (2020). or Science and Life. (2019)

Reference List: Books and book chapters		
Types of reference	**General format**	**Example**
Entire book, print version	Author, A. A. (Year). *Title of work*. Publisher.	Poincaré, H. (2022). *The foundations of science: Science and hypothesis, the value of science, science and method*. DigiCat.
Entire book, electronic version	Author, A. A. (Year). *Title of work.* Publisher. URL	Svendsen, S., & Lober, L. (2020). *The big picture/academic writing: The one-hour guide* (3rd digital ed.). Hans Reitzel Forlag. https://thebigpicture-academicwriting.digi.hansreitzel.dk/
Book co-edited with author	Author, A. A. (Year). *Title of work.* (A.A. Editor, Ed.). Publisher.	Plath, S. (2000). *The unabridged journals* (K.V. Kuklil, Ed.). Anchor.
Edited book (without author)	Editor, A. A. (Ed.). (Year). *Title of work.* Publisher.	Torino, G. C., Rivera, D. P., Capodilupo, C. M., Nadal, K. L., & Sue, D. W. (Eds.). (2019). *Microaggression theory: Influence and implications.* John Wiley & Sons. http://doi.org/10.1002/9781119466642
Book chapter (printed version)	Author, A. A., & Author, B. B. (Year). Title of chapter. In A. Editor, B. Editor, & C. Editor (Eds.), T*itle of book* (pp. xxx-xxx). Publisher.	Dillard, J. P. (2020). Currents in the study of persuasion. In M. B. Oliver, A. A. Raney, & J. Bryant (Eds.), *Media effects: Advances in theory and research* (4th ed., pp. 115-129). Routledge.
Book chapter (electronic version)	Author, A. A., & Author, B. B. (Year). Title of chapter. In A. Editor, B. Editor & C. Editor (Eds.), *Title of book* (pp. xxx-xxx). Publisher. URL	Le Couteur, D., Kendig, H., Naganathan, V., & McLachlan, A. (2010). The ethics of prescribing medications to older people. In S. Koch, F. M. Gloth & R. Nay (Eds.), *Medication management in older adults* (pp. 29-42). Springer. https://doi.org/10.1007/978-1-60327-457-9_3
Edition of a book other than first	Author, A. A., & Author, B. B. (Year). *Title of book* (xx ed.). Publisher.	Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). Qualitative data analysis: A methods sourcebook (3rd ed.). Sage.

Online reference. No author. No editor	Title of entry. (n.d.). In Title of reference work (xx ed.,Vol xx). URL	Heuristic. (n.d.). In Merriam-Webster's online dictionary (11th ed.). http://www.m- .com/dictionary/heuristic * n.d. (no dates)

Reference List: Periodicals		
Periodicals refer to materials published periodically such as journals, magazines, newspapers, newsletters, pamphlets etc General reference Author, A. A., Author, B. B., & Author, C. C. (year). Title of article. *Title of Periodical, volume number* (issue number), pages.		
Type of reference	**General format**	**Example**
Journal with DOI	Author, A. A., & Author, B. B. (year). Title of article. *Title of Periodical*, *volume number* (issue number), pages. https://doi.org/xx.xxx/yyyy	Graham, S., & Harris, K. R. (2016). A path to better writing. *The Reading Teacher*, *69*(4), 359-365. https://doi.org/10.1002/trtr.1432
Journal articles without DOI (print version)	Author, A. A., Author, B. B., & Author, C.C. (year). Title of article. *Title of Periodical*, *volume number* (issue number), pages.	Eutsler, L., Mitchell, C., Stamm, B., & Kogut, A. (2020). The influence of mobile technologies on preschool and elementary children's literacy achievement: A systematic review spanning 2007-2019. *Educational Technology Research and Development, 68*(4), 1739–1768.
Journal article without DOI (online)	Author, A. A., Author, B. B., & Author, C.C. (year). Title of article. *Title of Periodical, volume number* (issue number), pages. URL	Zazkis, R., & Nejad, M. J. (2014). What students need: Exploring teachers' views via imagined role-playing. *Teacher Education Quarterly, 41*(3), 67-86. https://eric.ed.gov/?id=EJ1079169
Article in megazine	Author, A. A., Author, B. B., & Author, C. C. (year, month or day if given). Title of article :Subtitle if any. *Name of Magazines, Volume Number* (issue number), pages.	Lyons, D. (2009, June 15). Don't iTune us: It's geeks versus writers. Guess who's winning. *Newsweek, 153*(34), 27.
Newspaper article in print	Author, A. A. (year, month day). Title of article :Subtitle. Title of Newspaper, pages.	Ahmad Ibrahim. (2023, December 4). Make digital literacy a priority. *NewsStraitTimes*, p.17.
Newspaper article in online paper	Author, A. A. (year, month day). Title of article: Subtitle. *Title of Newspaper.* URL	Prema Ponnudurai (2023, December 3). Revolutionising digital edu *The Star.* https://www.thestar.com.my/

Reference List: Other sources of printed materials		
General reference Author, A. A., Author, B. B., & Author, C. C. (year). Title of article. *Title of Periodical, volume number* (issue number), pages.		
Type of reference	**General format**	**Example**
Published dissertation and thesis. Database can be from a commercial database or an institutional database	Author, A. A. (Year*). Title of dissertation or thesis* (Unpublished doctoral dissertation or master's thesis). Name of Institution awarding the degree. Database name. URL	Andrea, H. (2021). *Effective networked nonprofit organizations: Defining the behavior and creating an instrument for measurement* (Doctoral dissertation). https://etd.ohiolink.edu/
Unpublished dissertation and thesis	Author, A. A. (Year*). Title of dissertation or thesis* (Unpublished doctoral dissertation or master's thesis). Name of Institution awarding the degree.	Ong, L.E. (2020). The mental activities involved in Malaysian Science Examinations. (Unpublished master thesis). University of Connecticut.
Paper / poster presentation	Presenter, A. A.(Year, Month, Day). *Title of paper or poster*. [Description of presentation]. Title of conference, location.	Evans, A. C., Jr., Garbarino, J., Bocanegra, E., Kinscherff, R. T., & Márquez-Greene, N. (2019, August 8–11). *Gun violence: An event on the power of community* [Conference presentation]. APA 2019 Convention, Chicago, IL, United States.
Conference papers presented /delivered online or virtually	Presenter, A. A. (Year, Month, Day). *Title of paper or poster*. [Description of presentation]. Title of conference, location. DOI/URL	Mason, I. & Missingham, R. (2019, October 21–25). *Research libraries, data curation, and workflows* [Paper presentation]. eResearch Australasia Conference, Brisbane, QLD, Australia. https://bit.ly/2v1CjRg

Kertas kerja dalam persidangan yang diterbitkan (bercetak)	Presenter, A. A.(Year). Title of paper. Paper or poster session presented in the meeting of Organization Name, Location. page number	Nurulhidayah Lucy Abdullah & Ong. S.L. (2009). Use of performance task in assessing Year Six students' levels o f mathematical thinking. Proceedings of the third International Conference on Science and Mathematics Education, Penang. pp. 386-394
	Author, A.A. (Year). *Title of work* (Report No.xxx). Location: Publisher.	United States Curriculum Centre for the Study of Mathematics. (2004). Everybody counts: A report to the nation on the future of mathematics education. (Report number if any). Retrieved from http://www. athcurriculumcenter Malaysia Ministry of Education. (2006). Integrated curriculum for primary schools: Curriculum specifications. Kuala Lumpur: Curriculum Development Centre.

Reference List: Other Sources		
Type of reference	**General format**	**Example**
Youtube or online video	Channel name. .(Year, Month Day). *Title*. Platform. URL	Andy Johnson. (2021, July 2). *Action research I: The basics* [Video]. YouTube. https://www.youtube.com/watch?v=u755itz4eDo
Podcast or audio recording	Lastname/ Surname .(Year, Month Day).*Title*. Publisher. URL	Fennell, M. (Host). (2017, August 4). *Download this show: Would you pay for this podcast?* [Audio podcast]. Australian Broadcasting Corporation. http://www.abc.net.au/radionational/programs/downloadthisshow/vpn/8771498
Webinar (recorded)	Author, A. .(Year, Month Day).*Title* [Webinar]. Publisher. URL	Babas, J. B. R., Lobriza, E., & Pingil, N. P. (Facilitator). (2022, March 11). *Research in action: A webinar on CBAR* [Webinar]. West Visayas State University. https://www.youtube.com/watch?v=Ml4n6NMLGEI
Webpage	Author, A. A. (Year, Month Day). *Title of the webpage*. Site Name. URL Organisation's Name. (Year, Month Day). *Title of the webpage.* Site Name. URL	Boss, S. (2020, January 21*). How teachers can learn through action research.* Edutopia. https://www.edutopia.org/article/how-teachers-can-learn-through-action-research/
Blog post	Author, A. A. (Year, Month Day). Title of post [Description of form]. https:// www.xxx	Meyers, P. Z. (2007, January 22). The unfortunate prerequisites and consequences of partitioning your mind [Web log message]. https://scienceblogs.com/pharyngula/2007/01/22/the-unfortunate-prerequisites
Message sent to an online forum or discussion group		Chalmers, D. (2000, November 17). Seeing with sound [Online forum comment]. http://groups.google.com/group/sci.psychology.consciousness/ Note: Do not italicise titles of unpublished works.

Electronic mailing list		Siti Aminah. (2012, Januari 8). Pengukuran IQ [Electronic mailing list message]. http://tech.groups.yahoo.com/group/message/670
Computer software	Rightsholder, A. A. (Year). Title Of program (Version number) [Description of form]. Location: Name of producer **or** Rightsholder, A. A. (Year). Title Of program [Description of form]. https:// xxxx	Esolang, A. N. (2014). Obsure Reference Generator [Computer software]. E & K Press.
Personal communication (interview, conversation via telephone, etc.)	Author, A. A. (personal communication, Year, Month Day)	Rujhan Ishak. (personal communication, 2022, June 18)

Referencing tables and figures	
Table components	
Number	• The table number is located above the table • Bold (e.g. **Table 1**)
Title	• The table title is positioned one line below the table number, with double spacing • Use non-bolded italic title case • No period at the end
Headings	• All tables should include column headings, including stub heading
Body	• The table body comprises all the rows and columns of a table. • The spacing within the body can be single, one and a half, or double-spaced, depending on clarity • Keep the use of borders or lines in a table to a minimum for clarity • Avoid vertical borders to separate data
Note	• A note may be included below the table to describe the contents of the table that cannot be understood from the table title or body alone, (e.g. definitions of abbreviations, copyright attribution). • Notes are double-spaced and alligned to the left. • Not all tables require table notes

Example

Table 1

Effect of Intervention

Types of intevention	Changes detected	Changes not detected
X	25	40
Y	13	35

Note. Reprinted from Power on Intervention by V. Rachel, 2021, Pearson. Copyright 2021 by Veil Rachel

Figure components	
Number	• The figure number is located above the figure • Bold (e.g. **Figure 1**)
Title	• The figure title is positioned one line below the figure number, with double spacing • Use non-bolded italic title case • No period at the end
Image	• The visual element of the figure is the chart, graph, photograph, drawing, or image.
Legend	• A figure legend / key, if applicable, should be positioned within the borders of the figure and explain any symbols used in the figure image.

Note	• A note may be included below the figure to describe the contents of the figure that cannot be understood from the figure title, image, and/or legend alone, (e.g. definitions of abbreviations, copyright attribution). • Notes are double-spaced and alligned to the left. • Not all figures require figure notes

Example

General guidelines

- In the text, refer to every table/figure by its number.

  Eg. As shown in Table 3

  not

  The table/figure above shows..... or table/figure on page 3 shows....

- When you copy or modify a table/figure from another source, you need to provide a copyright attribution in the table/figure note to show the origin of the information/material.

The findings of the research can be presented in the form of tables or figures. Figures refer to any form of illustration such as charts, graphs, photo pictures, and drawings except tables.

(1) Present a table/figure in the text

Present table/figures in the text	In the text, refer to every table/figure by its number. Eg. As shown in Table 3
Label a table in an appendix Label a figure in an appendix	Table A1, Table A2… (For APPENDIX A) Figure A1, Figure A2…(For APPENDIX A)

<table>
<tr>
<td></td>
<td>
Table 1 (Table numberin bold)

Participant Characteristics (Title in italics)

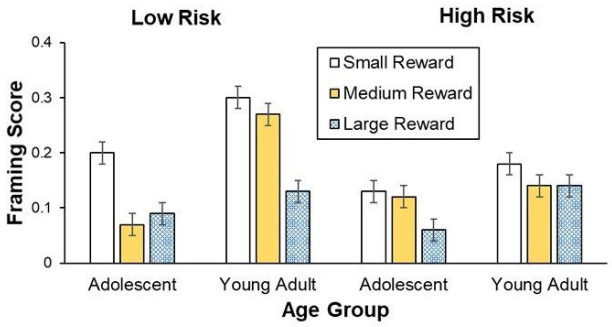
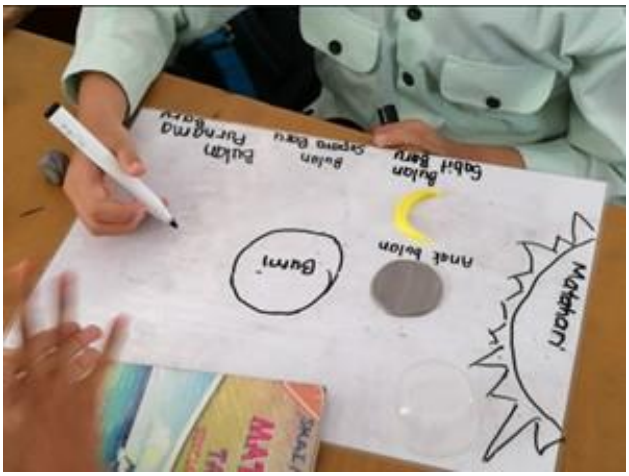
<table>
<tr><th></th><th>Need Training</th><th>Do Not Need Training</th></tr>
<tr><td>Used GSP</td><td>220</td><td>40</td></tr>
<tr><td>Never used GSP</td><td>188</td><td>67</td></tr>
</table>
Note:
(1) There are no vertical lines in the table.
(2) If the table title is long (2 rows) then the first and second rows are typed one line spacing.
</td>
</tr>
<tr>
<td>Referencing of tables in the text</td>
<td>
In the text, table is referred to by using table numbers.

Example:

(1) Analysis of findings from the questionnaire in Table 1 shows that...

(2) Don't write:

"The table above (below) shows..."
"The table on page 32 shows..."
</td>
</tr>
</table>

The position of the figure in the text	The title of the figure is placed at the top of the figure. Example: **Figure 1** (Figure number in bold) *Framing Scores for Different Reward Sizes* (Title in italics) 
	Example: **Figure 2** (Figure number in bold) *Drawing the Different Phases of the Moon* (Title in italics) 

Guide to cite references into the text	
Author	**Example**
An author	Citing the author's ideas. Examples: (i) Overloaded curriculum have led to inadequate teaching time and use of suitable teaching method (Kusi, 2017). (ii) Kusi (2017) found that overloaded curriculum have led to inadequate teaching time and use of suitable teaching method. (iii) In a research conducted in 2017, Kusi found that overloaded curriculum have led to inadequate teaching time and use of suitable teaching method.
Citing a source multiple times in one paragraph	Introduce the source early in the paragraph, with the author as part of the sentence rather than in brackets. For example: Bryman (2016, p. 100) describes several aspects of the data gathering process. For the rest of the paragraph, you can refer back to the author by name or pronoun when elaborating on their ideas. For example: He notes that the relevance and number of questions can affect participation rates. Bryman also found that…
Two authors	Jekri and Han (2020) also identified the lack of basic knowledge of STEM teaching and learning as the main challenge faced by teachers in implementing STEM teaching and learning in secondary schools.
Three or more authors	When a source that has three or more authors is cited, include the name of only the first author plus 'et al.' (an abbreviation of 'et alia' which means 'and others') in every citation, including the first citation. Fazilah Razali et al. (2020) found that science motivation has direct influence towards the formation of STEM-related careers among the 419 form four science students in Selangor, Malaysia.
Works with the same author and same year	When multiple references have an identical author (or authors) and publication year, include a lowercase letter (a, b, c, etc.) after the year. The year-letter combination is used in both the in-text citation and the refence list entry. (Judge & Kammeyer-Mueller, 2012a) Judge and Kammeyer-Mueller (2012b)
Corporate or group author Example: Associations, Government Agencies, etc	Ministry of Education Malaysia (MOE), 2022 ... (first citation) MOE (2022)… (subsequent citations)

Author	Example
Authors with same surname	If the first authors of multiple references share the same surname but have different initials, include the first authors' initials in all in-text citations, even if the year of publication differs. Initials help avoid confusion within the text and help readers locate the correct entry in the reference list. J. Taylor & Neimeyer (2015) and G. Taylor (2015) stressed that …
No author	If no author is stated, the title takes the author position. Note: The key words of the book title are capitalised when used in text, but not in the References list.
Citations from a secondary source	Arnett (as cited in Claiborne & Drewery, 2010) suggests there is an emerging adult stage inbvthe lifespan of humans, covering young people between the ages of 18 and 25 years. Note: List Claiborne & Drewery in your reference list, not Arnett.

Direct quotation

Use quotation marks and include page numbers.

Fullan and Langworthy (2014) point out that "The foundation of teacher quality is pedagogical capacity – teachers' repertoire of teaching strategies and ability to form partnerships with students" (p.3).

Alternatively:

"The foundation of teacher quality is pedagogical capacity – teachers' repertoire of teaching strategies and ability to form partnerships with students" (Fullan & Langworthy, 2014, p.3).

A quotation of 40 or more words should be formatted as a freestanding, indented block of text without quotation marks. Note the location of the final full stop.

Saliza Abdul Rahim (2019) concludes that:
This study proves that if a student has a positive perception towards Science subject,the development of the 21st century skills can easily be applied during the teaching and learning process both inside and outside of the classroom. From the outlook of these skills, teachers, educational organizations and policy makers, especially the Curriculum Development Division, can identify the weaknesses and shortcomings on the needs of the 21st century skills among students. Many of the more creative and innovative strategies and methods of teaching and learning as well as the 21st century-oriented skills need to be emphasized by teachers. (p. 587)

If you quote from online material and there are no page numbers (Example: HTML based document), use the paragraph number (para.) instead.

Example of writing references

Fullan, M., & Langworthy, M. (2014). A rich seam how new pedagogies find deep learning. Pearson.

Single line spacing

Double line spacing

Sazila Abdul Rahim. (2014). Science and 21st century skill: Students' perspective. International Journal of Recent Technology and Engineering, 8(1), 584-588.

Note:

The current edition of APA does not specify the indent spacing. It can be a single tab or user-defined position for the second line, but it must be consistent. Use a hanging indent for each entry and space between entries on each line.

Example of writing text

Text Writing		Sample Text
The use of numeral after nouns	Table 1 shows the planning schedule for the implementation of the action review process. Each plan has been set a date so that the research goes smoothly. Figure 2 shows four pieces of pictures...	Table 1 and Figure 2 refer to the use of numeral after noun
Use of numeral	A total of 15 research participants were involved in the research.	Numbers 10 and above should be written in numeral for example: 10,11,12,...
Use of words	They consisted of seven male research participants and eight female research participants from the Year 5 pupils.	Numbers 1 to 9 should be written in words for example: one, two, eight...

Additional Notes

1. NUMBERS WRITTEN IN NUMERAL

ASPECT	EXAMPLE	
Number 10 and above	12 cm 25 years	13 lists 105 words
Numbers representing mathematical functions	multipy by 5 Over 5% of samples	3 more times 0.33 from
Numbers representing time, date, score etc	1 hour 24 minutes Score 4 on a scale of 5	12:30 a.m. Table 4

2. NUMBERS WRITTEN IN WORDS

ASPECT	EXAMPLE	
Any number at the beginning of the sentence, title	Forty percent of the research participants shows improvement	Twelve students showed improvement and another 12 students ...
Common fractions	Two-third majority	One fifth of the class

3. COMBINATION OF NUMBERS AND WORDS

ASPECT	EXAMPLE	
Situations to improve	Ten 7-point scales	2 two-way interactions

G IMPLEMENTATION OF PRESENTATION

1. The presentation by each student is assessed by one examiner who is the lecturer for this course.
2. During the presentation session, all students are obliged to attend and attendance should be taken as it is counted as face-to-face interaction.
3. Assessment is based on the marking rubric as defined in the presentation rubric.
4. The duration of presentation for each student is 30 minutes including a question and answer session.
5. Students are required to use appropriate digital materials to aid the presentation.
6. Students are assessed on the ability to demonstrate outstanding application of various digital skills, media resources and technology by recognising digital rights, being responsible and ethical in science education research
7. Students who have completed the presentation need to make corrections and revisions based on the comments given by the examiner before submitting the final research proposal.

H FREQUENTLY ASKED QUESTION

1. **What kind of permission is required for students to conduct research in an educational institution?**

   Students must obtain permission from the IPGK director, the educational institution authority and parental consent if necessary.

2. **How far does data exploration analysis need to be carried out in the investigation for PISMP?**

   Data exploration analysis should be carried out at least coding, data input process, the existence of missing data values, marginal data, extreme value data, inferential statistical assumptions and normality disaggregation.

3. **Can students refer to resources that exceed 10 years?**

   Selection of the design of the survey whether it is a case study, experimental study, survey study, ethnographic study and a survey should take into account all the factors of the feasibility of the study such as the duration of the required study, respondents, location and so on. Students also need to discuss with supervisors to reach mutual agreement.

4. **How many research objectives and research questions should be addressed in a research?**

   The number of objectives and questions of a research should correspond to the focus of the study.

5. **Should the title of a research begin with a noun?**

   Writing a working paper is the same as writing a book title. Although the title construction is not in a single complete sentence, it is common to write this title using nouns.

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Pusat Pembanguna Akademik. (2018). *Buku panduan penyelidikan tinjauan.* Institut Pendidkan Guru Malaysia.

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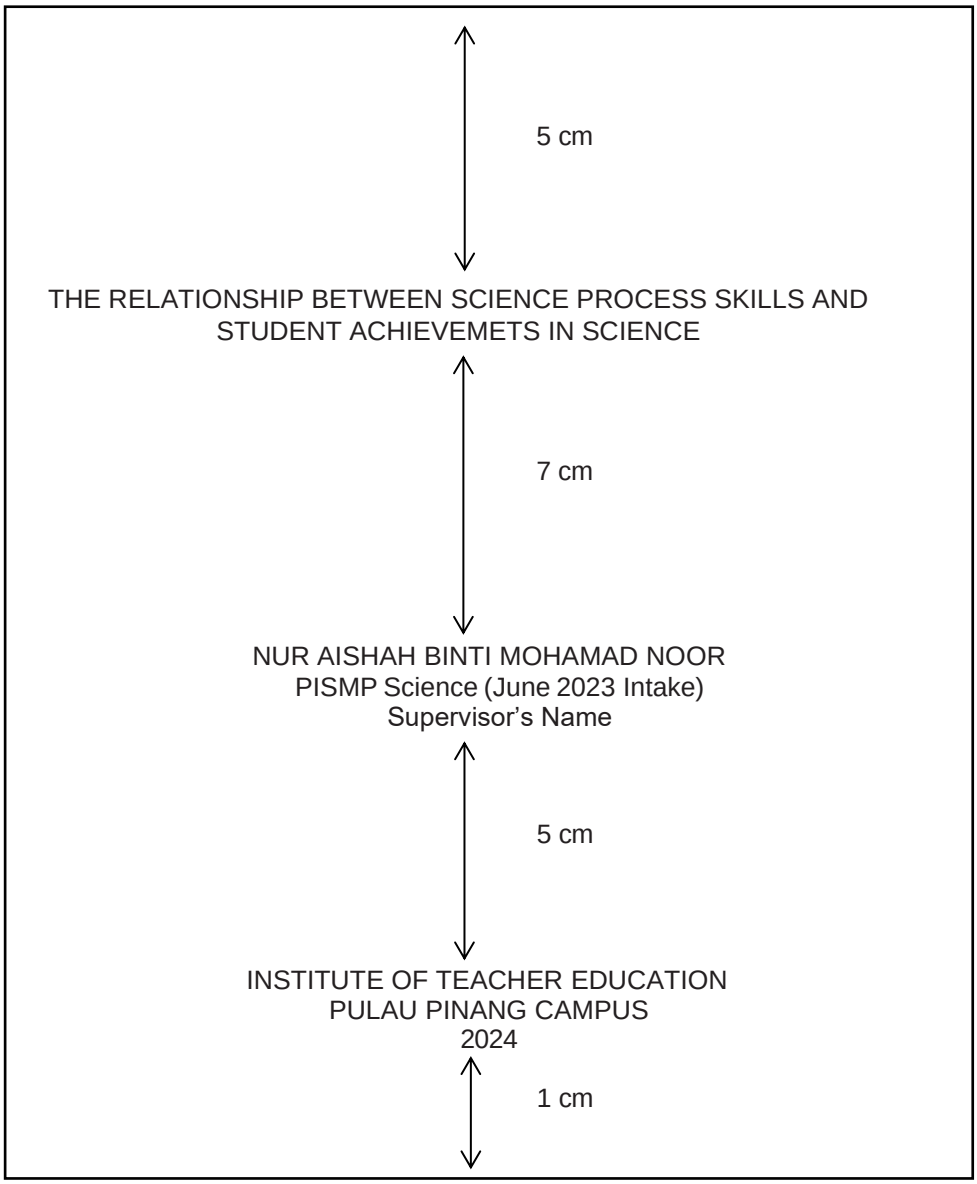
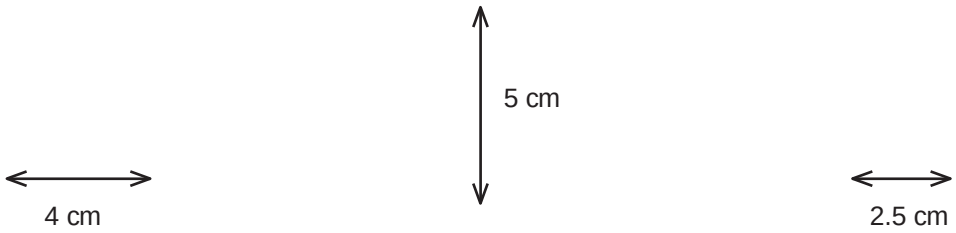
6	Dr. Sumaiyah binti Abd Rahim	Institut Pendidikan Guru Malaysia Kampus Darulaman
7	Dr. Yeoh Poh Choo	Institut Pendidikan Guru Malaysia Kampus Pulau Pinang

APPENDIX A EXAMPLE OF COVER PAGE FOR RESEARCH PROPOSAL

EXAMPLE OF LAYOUT ON THE COVER

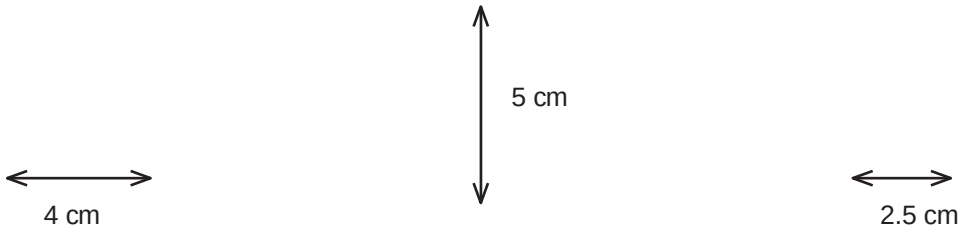


APPENDIX B CONTENT



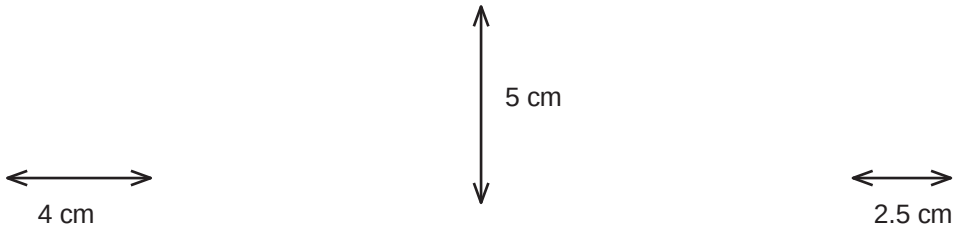
CONTENT

APPENDIX C LIST OF TABLES



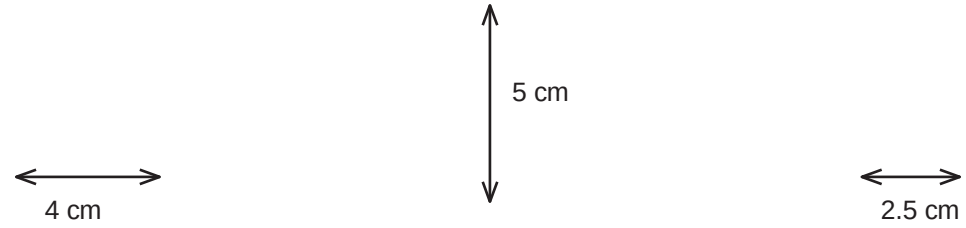
LIST OF TABLES

PAGE



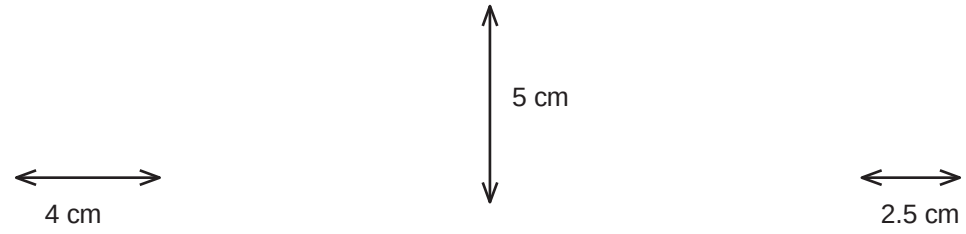
LIST OF FIGURES

PAGES



LIST OF APPENDICES

PAGES



LIST OF ABBREVIATIONS

APPENDIX G RECORD OF COLLABORATION

RECORD OF STUDENT-SUPERVISOR COLLABORATION

STUDENT	
GROUP	
INTAKE	
SUPERVISOR	
RESEARCH TITLE	

DATE / TIME	TOPIC OF DISCUSSION / SUPERVISOR'S COMMENTS	STUDENT'S SIGNATURE	SUPERVISOR'S SIGNATURE

APPENDIX H ASSESSMENT FORM FOR SURVEY RESEARCH PROPOSAL

EXAMPLE OF ASSESSMENT FORM FOR SURVEY RESEARCH PROPOSAL

STUDENT	
GROUP	
INTAKE	
SUPERVISOR	
RESEARCH TITLE	

ASSESSMENT CRITERIA	MARKS	REMARKS
INTRODUCTION (15 marks) • Background • Problem Statement • Research Purpose (Objectives & Hypothesis) • Conceptual Framework • Significance • Operational Definition		
LITERATURE REVIEW (15 marks) • Research Theory/Model • Previous Research Finding		
METHODOLOGY (15 marks) • Research Design • Sampling • Instrument (Source, Validity & Reliability) • Pilot Study • Data Collection • Data Analysis		
WRITING STYLE & REFERENCING (5 marks) • Clear and concise • Free of errors in grammar, spelling, and punctuation • Comply with latest APA format		
TOTAL (50 MARKS)		

EXAMINER'S SIGNATURE

.....

Name :

Date :

APPENDIX I ASSESSMENT FORM FOR SURVEY PROPOSAL PRESENTATION

EXAMPLE OF ASSESSMENT FORM FOR SURVEY PROPOSAL PRESENTATION

STUDENT	
GROUP	
INTAKE	
SUPERVISOR	
RESEARCH TITLE	

ASPECT	COMMENTS	MARKS
PRESENTATION (10 marks) • Clear and concise presentation • Able to answer questions clearly and confidently		
UTILISATION OF DIGITAL SKILLS (10 Marks) • Application of digital skill, media resoucres and technology • Responsible and ethical in research		
TOTAL (20 MARKS)		

EXAMINER'S SIGNATURE

.....

Name :
Date :

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