

IB ESS Internal Assessment guide - IA checklist

Criterion A: Research, Question, and Inquire (max 4 marks)	Checklist
1. Defining the Environmental Issue	- Is the environmental issue identified clearly as a local or global concern? - Is the chosen issue relevant to ESS? - Is the topic sufficiently narrow and focused?
2. Background Information	- Is the background research directly linked to the selected issue? - Does it provide a strong basis for understanding the problem? - Is there a clear explanation of the connection between the dependent variable and the study? - Is the chosen range for the independent variable justified?
3. Formulation of the Research Question	- Is the research question original and specific? - Does it focus on a precise aspect of the issue? - Are variables clearly included? - Is the independent variable stated (or are two variables being correlated)? - Is the dependent or derived dependent variable identified? - Are the chosen variables relevant and suitable for the topic?
4. Use of Scientific Names	- Are the scientific names of organisms applied correctly? - Do they enhance clarity and accuracy of the research? - Are they consistently relevant to the study?

Criterion B: Strategy (max 4 marks)	Checklist
1. Relevance of Strategy	- Does the proposed strategy directly address the environmental issue? - Is there a clear link to the research question?
2. Status of the Strategy	- Is the strategy already in place, or is it still under development? - Is its current stage clearly described?
3. Identification of Tensions	- Are conflicts or tensions identified when the strategy is viewed from different standpoints? - Are at least two contrasting perspectives (worldviews) included? - Is there a clear review of how each perspective views the issue? - Are positions on the strategy explained? - Are possible outcomes of the tension (both positive and negative) discussed? - Is a personal stance included?
4. Strength of Arguments	- Are arguments logical, well-structured, and supported by evidence? - Are academic or reliable references used for both the issue and the strategy? - Do the references explain how the strategy connects to the research question?
5. Personal Perspective	- Does the student express their own viewpoint on the strategy? - Is this perspective informed by multiple perspectives? - Does it consider the potential consequences of the strategy?

Criterion C: Method (max 4 marks)	Checklist
1. Appropriateness of Data	- Does the method produce data that is relevant to the research question? - Is the type, quantity, and number of replicates suitable for the investigation? - Is the data-collection procedure explained in a clear and structured way?
2. Replicability	- Could another person repeat the method based on the description provided? - Are all necessary details included, such as: • Fieldwork site/location • Survey or questionnaire design • Criteria for participant selection • Database or website sources • Equipment, materials, chemicals, or probes used • Method of measurement • Independent variable (range, intervals) • Sampling frequency and duration
3. Use of Scientific Language	- Are scientific terms applied accurately and consistently? - Are organism names given in correct scientific (binomial) form?
4. Visual Aids	- Are diagrams, sketches, charts, or photos included to clarify the procedure? - Are axes, scales, and labels correctly shown where needed? - Are screenshots used effectively to demonstrate data collection from databases or models?
5. Procedures and Trials	- Is there evidence of a preliminary or pilot study, if relevant? - Are sufficient measurements and repeats included (e.g., at least five values of the independent variable, each with three repeats)? - For surveys, is the sample size large enough (around 30 participants per group)?

Criterion D: Treatment of Data (max 6 marks)	Checklist
1. Raw and Processed Data	- Are both raw and processed datasets clearly presented? - Are figures, photos, or drawings included and correctly labeled when relevant? - Is the presentation of text, tables, calculations, graphs, and visuals consistent and concise? - Are all scientific units and symbols applied correctly? - Is data formatted with appropriate units, uncertainties, and consistent decimal places or significant figures? - Is the display of raw and processed data clear, precise, and directly linked to the research question? - Are sample calculations or screenshots included to illustrate the processing method? - Are graphs relevant, correctly scaled, and enhanced with lines of best fit or curves where needed? - Are metric (SI) units used throughout? - Are decimal places consistent with the precision of measurements?
2. Presentation of Data	- Is data arranged into clear tables with suitable titles and numbering? - Do headings for rows and columns include units and uncertainties where relevant? - Is a representative portion of raw data shown when the dataset is large? - Is processed data presented in a way that allows trends and patterns to be analyzed? - Are charts/graphs appropriately scaled and sized for interpretation? - Are qualitative observations included where appropriate? - Is the layout of processed data clear, logical, and easy to follow? - Are full worked calculations provided for more complex data processing? - For statistical analysis, are null and alternative hypotheses clearly stated? - Are chosen statistical tests justified and their results explained correctly?
3. Data Analysis	- Is variation in the data shown (e.g., using standard deviation, standard error, range, R^2 values, or error bars)? - Is significance testing applied correctly and appropriately? - Are outliers identified and addressed appropriately?

4. Measurement Uncertainty	- Are uncertainties in measurements identified and reported? - Is the reasoning behind the size of uncertainties explained? - Are error bars used on graphs to represent uncertainty?
5. Data Processing	- Is the data processing method efficient and at the right level of complexity for the investigation? - Are suitable tools and techniques used for processing? - Are trend lines realistic and representative of the data shown? - Is the choice of statistical tests justified, and are data-display methods appropriate? - Are calculations and graphical methods accurate and reliable?

Criterion E: Analysis and Conclusion (max 6 marks)	Checklist
1. Data Analysis	- Are trends, patterns, and correlations in the results identified and explained? - Are trend lines recognized and described correctly (e.g., positive, negative, or inverse relationships)? - Is the interpretation of data used to develop a valid conclusion? - Are statistical tests explained clearly, including key values and significance levels? - If statistical tests are used, are the results interpreted accurately? - Are additional indicators of reliability (e.g., coefficient of determination R^2, error values) considered? - Are sources of uncertainty acknowledged and their potential impact on results discussed? - Are issues of bias, reliability, and validity addressed? - If survey or questionnaire data are used, is the possibility of bias considered? - Are measures of variation (e.g., range, standard deviation) applied to judge reliability?

	- Is data referred to directly in the text (e.g., with specific values, tables, or figures)? - Is the limitation of sample size recognized, and its effect on uncertainty discussed?
2. Conclusion	- Does the conclusion explicitly answer the research question? - Is the hypothesis stated as being supported or rejected, based on the evidence? - Are conclusions backed by the data rather than assumptions? - Is variability in the data acknowledged, and its effect on the conclusion considered? - Is relevant scientific literature cited to support or challenge the findings?

Criterion F: Evaluation (max 6 marks)	Checklist
1. Weaknesses and Limitations	- Are potential flaws in the method or procedures identified and explained? - Were control variables appropriately managed throughout the investigation? - Was the precision of measurements sufficient to ensure reliable results? - Are the natural limitations of the investigation (e.g., data range, assumptions) recognized? - If simulations or models were used, are their limitations compared to real-world data discussed? - Are unrealistic "human errors" avoided in the evaluation?

2. Uncertainties	- Are possible sources of systematic error (e.g., faulty equipment, calibration issues) described and explained? - Are random uncertainties acknowledged, such as environmental or biological variability? - Is the reliability and validity of the results evaluated in relation to these uncertainties? - Is the influence of the measurement process itself considered? - Are sampling range, frequency, and adequacy of controls addressed?
3. Improvements and Extensions	- Are clear and realistic suggestions given for improving weaknesses or limitations? - Is the likely impact of these improvements evaluated? - Are the proposed improvements practical within a school or fieldwork context? - Are new, unresolved questions identified that arose from the study? - Do these questions connect logically to the method, environmental topic, or issue investigated? - Do they extend the scope of the investigation beyond its original boundaries?