3.1 Research methods and the experimental study

Name: _____ Class: _____ Date: _____ **Total: 28 marks**

KEY WORDS independent variable • descriptive statistics

Research methods and the experimental study

Objective

Identify variables, designs and controls, compute descriptive statistics, apply the ethical framework, and structure the experimental-study report (approaches to researching behaviour plus the IA).

1 Key knowledge and worked examples

Methods toolkit. Experiments: lab, field, natural, quasi; independent, repeated, matched designs with counterbalancing. Sampling: random, opportunity, volunteer; sampling chooses who, ALLOCATION assigns conditions. Descriptive statistics: mean dragged by outliers, median resists, mode for categories; range vs SD. Correlation $r \in [-1, +1]$, never a cause. Qualitative: case studies, observations with inter-rater reliability, interviews, focus groups, questionnaires, triangulation. Ethics: consent, deception + debrief, protection, withdrawal, confidentiality, 3Rs. Evaluation: generalizability, credibility, bias. IA: aim, exploration, analysis, evaluation, appendices, with descriptive statistics.

2 Practice

2.1 In the rehearsal experiment, state the independent variable and the dependent variable, each operationalised. [2]

2.2 State one strength and one limitation of a repeated-measures design, naming the countermeasure for the limitation. [3]

2.3 Compare random sampling with opportunity sampling for a school study: one advantage and one disadvantage of each. [4]

2.4 In the rehearsal pilot, semantic-processing recall scores were 9, 8, 10, 7, 9 and 9. Calculate the mean and the median of the set, and state what the two condition means alone cannot show. [4]

2.5 State two ethical requirements the IA must satisfy before any data collection. [2]

3 Exam-style questions

3.1 *(IA design style.)* Design a simple experiment on the effect of background music on anagram solving: state the aim, the design with a reason, two controls and the ethical safeguards. [6]

3.2 *(Statistics style.)* A pilot finds acoustic recall of 4, 6, 8 (mean 6) and semantic recall of 9, 8, 10 (mean 9). A student writes "the semantic condition is better, proven by the means". Rewrite the claim correctly, giving two reasons the means alone cannot prove it. [4]

3.3 *(Method choice.)* A researcher wants to understand why students avoid asking questions in class. Compare an anonymous questionnaire with semi-structured interviews, and recommend one, with a reason. [3]

Solutions

2.1 IV: the level of processing at encoding, operationalised as acoustic counting (does the word rhyme with X?) versus semantic judgement (does the word fit this sentence?) (1). DV: the number of words correctly recalled in 60 seconds, operationalised as the count of correctly spelled list words written (1).

2.2 Strength: no participant variables between conditions, since everyone does both – individual differences cannot explain the difference in recall (1). Limitation: ORDER effects (practice or fatigue) carry over between conditions (1); counterbalanced by splitting participants into AB and BA halves (1).

2.3 Random sampling: every student has an equal chance, improving representativeness (1); but it needs a full list, is slow, and refusals still skew the achieved sample (1). Opportunity sampling: quick and cheap from the classes available (1); but over-represents the accessible group (one year group, one timetable slot), limiting generalizability (1).

2.4 Semantic set 9, 8, 10, 7, 9, 9: mean $= 52/6 = 8.67$ words (1); ordered 7, 8, 9, 9, 9, 10, median $= (9 + 9)/2 = 9$ words (2). The means alone cannot show VARIABILITY (the spread within each condition), and they describe only this sample – nothing about causation or chance until tested (1).

2.5 Any two of: informed (or parental/guardian where required) consent obtained before participation; no deception beyond what is unavoidable, with a full debrief; right to withdraw at any time including withdrawal of data; protection from harm; confidentiality/anonymity of data (2).

3.1 Aim: to investigate the effect of background music (present vs absent) on the number of anagrams solved in three minutes (1). Design: repeated measures – the same solvers do both conditions, removing individual differences in verbal ability; counterbalancing (half music-first) removes order effects (2). Controls: matched 20-anagram lists per condition, the same room and volume, written standardised instructions, a fixed 3-minute window (2). Ethics: informed consent with the right to withdraw, anonymised scoring, no deception – the debrief explains the comparison after both conditions (1).

3.2 Correct claim: "In this pilot, the semantic condition's mean recall (9 words) was higher than the acoustic condition's (6 words)" (1). Reason one: no VARIABILITY is reported – with three scores each, an outlier or the small range could move a mean, so ranges or SDs belong with it (1). Reason two: the pilot is a SMALL OPPORTUNITY SAMPLE, so the difference describes these participants only; with no statistical test run, "proven" and "better" overstate a descriptive comparison (2).

3.3 Questionnaire: anonymous, so honest answers on an embarrassing topic, and many respondents quickly (1); but fixed answers miss unanticipated reasons, and social desirability survives anonymity (1). Semi-structured interviews pursue the unanticipated answer, so the MECHANISM behind avoidance emerges, but with fewer participants and interviewer effects. Recommendation: interviews first to map the reasons, then a questionnaire built from them to measure their spread (1 for a reasoned choice).

Review guidance: the substitution before each statistic; every choice carries a because; (R1 3.2) describe this sample, not a population. Authored guidance.