PA2554: Assignment 1 – Critical appraisal – Experiment

Assignment 1 – Critical appraisal

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Results of applying the checklist:

Table 1

ID	Evaluation item	Answer (Yes/No/NA)[1]	Justification (please elaborate)
1	Is the experiment understandable and interesting in general?	**Yes**	The authors have clearly outlined their experiment by providing background, aims, results, and conclusion for evaluating the impact of an often-disregarded aspect that is Task Description which is evaluated based on the results of Test-Driven Development.
2	Does the experiment have any practical value?	**Yes**	Software testing is an essential process before staging the application for deployment. According to the authors, task description, which divides jobs into discrete worker items, was a beneficial strategy in test-driven development, as it resulted in higher quality code.
3	Are other experiments addressing the problem summarized and referenced?	**Yes**	The authors presented several experiments, and their associated flaws were briefly summarized in the research paper by providing a reference. One such example in a research paper is that Author Munir [18] compared test-driven development and Test-last development, which was mentioned and supported by suitable references.
4	What is the population in the experiment?	-	The experiment enlisted the participation of 48 students.
5	Is the sample used representative of the population?	**Yes**	The sample used to represent the population is small set and it is divided by the method of sampling.
6	Are the dependent and independent variables clearly defined?	**Yes**	Table 3 presented in the experimental setting section of the research paper written by the author describes which variables were considered as independent and dependent for the experiment.

[1] Please note for item with ID 4, in the first column of Table 1, the answer will be the population used in the study and not a yes/no answer.

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7	Are the hypotheses formulated?	**Yes**	The 3.7 Hypotheses subsection of the Experimental setting section has been formulated.

8	Is the type of design clearly stated?	**Yes**	The crossover design was chosen by the author because it only requires a small number of participants, making it ideal for their experiments.
9	Is the design correct?	**Yes**	The design stated by the author is applicable for a few participants and it's an ideal usage for their experimentation.
10	Is the instrumentation described properly?	**Yes**	The researcher has briefly detailed their equipment for their chosen Task Description (i.e., independent variable) and examined the previous studies such that their flaws are mitigated by modifying the coarser and finergrained descriptions.
11	Is the validity of the experiment treated carefully and convincing?	**Yes**	The author verified the selected Linear Mixed Effects model by normalizing residuals. They have thoroughly verified the experiment results through visual inspection such as histograms, normal Q-Q plots, and boxplot. The summarized results in Table 12 are convincing enough for the model assessment.
12	Are different types of validity threats addressed properly?	**Yes**	The potential threats to the validity are discussed by the Author. He classified them into four different categories they are construct, internal, external, and conclusion validities. Each of these is addressed individually.
13	Has the data been validated?	**Yes**	The data is validated with many tests including statistical tests. Design validation, internal and external validation is also done.
14	Is the statistical power sufficient, are there enough subjects in the experiment?	**Yes**	There are different subjects used in the experiment but, the researchers used Linear mixed effects model (LMM) for the analysis.
15	Are the appropriate statistical tests applied? Are Parametric or non-parametric tests used and are they used correctly?	**Yes**	Statistical tests are performed to check the Granularity. The observations are verified by statistical tests that are done based on the Log Likeli hood Ratio (LRR) for nested models and these results are tabulated (Table 8)
16	Is the significance level used appropriately?	**Yes**	The significance level is used appropriately and the unsignificant factors are dropped off, that is described in section 3.8
17	Is the data interpreted correctly?	**Yes**	The data is interpreted correctly and the analysis report and the validated results are tabulated.

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18	Are the conclusions correct?	**Yes**	According to the analysis data provided by the Author, the conclusions are correct. It would have been more accurate if it is performed on more people.
19	Are the results not overstated?	**No**	The results are not overstated because the results and analysis reports meet the requirement
20	Is it possible to replicate the study?	**Yes**	It is possible, this can be replicated and improved by adding iterative development to it.
21	Is data provided?	**No**	The data is not completely provided by the Author, but he provided the results and analysis reports.
22	Is it possible to use the results for performing a meta analysis?	**Yes**	The results can be further used for performing the meta-analysis. The resultant analysis reports can be used further.
23	Is further work and experimentation in the area outlined?	**Yes**	The further work and the experimentation are outlined in the last paragraph of the Conclusions section. They mentioned the need for an iterative process to test the hypothesis. The author even mentioned extending their experimental design which can incorporate ITL development in the future.

Briefly answer the following questions (where possible support your answer with results of the checklist-based evaluation):

A. Does the chosen research method (experiment/case study) address the objectives in the study? Which other research methods could address the same objectives?

Answer: Yes, the results and analyses are published in a scientific approach. The selected research technique fulfils the aims of the study. Various research approaches might be a case study on how other algorithms could affect the performance.

B. What is the practical value of the given experiment?

Answer: The practical value of the experiment is to know the impact of the task description granularity in the TDD process, to know this the researchers experimented with the 48 graduate student and they used linear-mixed effect models for analyzing the correctness.

C. Which, if any, are the unaddressed ethical issues/concerns in the study?

Answer: Here in this experimentation, the authors didn't discuss the ethical issues.

D. What is your overall assessment of the quality of the experiment? What do you consider are the main strengths and major limitations of the study?

Answer: The entire assessment is conducive to the improvement of the clearly mentioned ways for investigating an overlooked aspect of TDD. Developers should focus on modest and manageable tasks at each iteration of TDD rather than trying to break down complex problems into smaller and more manageable

ones. The authors might take a more sophisticated approach by emphasizing the topic and giving students practical tasks aimed at equipping them with the capacity for breaking down large difficulties into smaller ones.

E. Please answer the following questions regarding the use of the given checklist:

a. Please respond to what extent do you agree or disagree with the following statement: *Overall, the checklist was easy to use.*

strongly agree	agree	neutral	disagree	strongly disagree
		✔		

b. Please respond to what extent do you agree or disagree with the following statement: *The question's formulations were easy to understand.*

strongly agree	agree	neutral	disagree	strongly disagree
	✔			

c. Please write the question numbers (from Table 1), *if any*, that were difficult to understand. Answer: NA

d. Please respond to what extent do you agree or disagree with the following statement: *The questions were easy to answer.*

strongly agree	agree	neutral	disagree	strongly disagree
		✔		

e. Please write the question numbers (from Table 1), if any, that were difficult to answer.
Answer: 9,11,14,15,22

f. What made it difficult to answer these questions?
Answer: There are several factors to take into account and expressing them succinctly is challenging.

g. Does the checklist cover all the important aspects (as mentioned in the guidelines for conducting case study research) for high-quality case study research?
Answer: Yes, the checklist covers all the important aspects of research.