WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Cognitive Load and Problem-Solving Capacity in Students: An Experiment

Roshni Sengupta [a]

[a] *Adamas University, School of Liberal Arts and Cultural Studies, Department of Psychology, Kolkata-126, India*

A B S T R A C T

The role of Cognitive Load on Problem-Solving may be both indirect and/or direct: if the cognitive demands of the task are too great for the individual to manage, their cognitive load goes up and their problem-solving ability is degraded (indirect impact), and if the problem is simply too hard for anyone, performance in general is restricted (direct impact) (Sweller et al., 1991). Present study attempts to examine the effect of Cognitive Load on Problem-Solving capacity of individuals. Data were collected from 5 female subjects (Mean Age= 18.4, SD= 0.54) after obtaining informed consent from each. A list of 10 Situational Judgement Tests, 2 lists of 15 jumbled 5-letter words, Pen & Paper. After data collection, data were cleaned and then analysed using appropriate statistical methods. A comparative chart for individual responses and time taken was made, and Descriptive Statistics was used to describe and summarize the data. Results indicate that both the percentage of correct responses, and time taken to solve the given problem, deteriorated during the introduction of Cognitive Load during the Experimental Condition.

Keywords: Cognitive Load, Problem-Solving Capacity, Descriptive Statistics.

1. Introduction

In the present experiment, Cognitive Load refers to the cognitive demands that any particular task requires of an individual, and Problem-Solving is presented as a cognitive function. Past experimentations have observed that changing the Cognitive Load may greatly change an individual's mental response to the given problem. The role of Cognitive Load on Problem-Solving may be both indirect and/or direct: if the cognitive demands of the task are too great for the individual to manage, their cognitive load goes up and their problem-solving ability is degraded (indirect impact), and if the problem is simply too hard for anyone, performance in general is restricted (direct impact) (Sweller et al., 1991). Many studies have investigated how cognitive load affects problem-solving ability in humans. These studies support the idea that high cognitive load reduces our ability to plan ahead and make precise calculations.

Independent Variable (IV): Cognitive Load- Cognitive Load refers to the amount of effort that is exerted or required while reasoning and thinking. Any mental process, from memory to perception to language, creates a cognitive load because it requires energy and effort (Kunda, 1999).

Dependent Variable (DV): Problem Solving- Problem Solving is a process for individuals to overcome a specific problem. That process, simply, begins at a starting point and continues until a conclusion is reached. The process includes the higher mental functions and creative thinking.

2. Method

Objective of the Experiment: To examine the effect of Cognitive Load on Problem-Solving capacity of individuals.

Null Hypothesis: Cognitive Load has no effect on the Problem-Solving capacity of an individual.

Alternative Hypothesis: Cognitive Load has a direct negative impact on the Problem-Solving capacity of an individual.

Participants: Data were collected from 5 female subjects (Mean Age= 18.4, SD= 0.54) after obtaining informed consent from each.

Table 1. Preliminaries

	Subject 1	Subject 2	Subject 3	Subject 4	Subject 5
Age (years)	18	18	19	19	18
Sex	Female	Female	Female	Female	Female
State	Fresh, Calm and co-operative	Fresh, calm and co-operative	Fresh, calm and co-operative	Fresh, calm and co-operative	Fresh, calm and co-operative
Date	22nd February, 2022	22nd February, 2022	22nd February, 2022	22nd February, 2022	22nd February, 2022
Time	15:13 P.M.	15: 24 P.M.	15:38 P.M.	15: 56 P.M.	16: 14 P.M.

Tools Used: A list of 10 Situational Judgement Tests, 2 lists of 15 jumbled 5-letter words, Pen & Paper.

Procedure:

i. Control Condition: A Non-Interfering Filler Task was given to the subject for 2 minutes. A list of 15 jumbled 5-letter words was then presented to the subject. Time taken, and number of correct responses were recorded. A rest period of 5 minutes was given to the subject before the experimental condition.

ii. Experimental Condition: A list of 10 Situational Judgement Tests were given to the subject to solve. After the subject completed solving those, a Non-Interfering Filler Task of 2 minutes was provided. A new list of 15 jumbled 5-letter words was then presented to the subject. Time taken, and number of correct responses were recorded.

Statistical Analysis: After data collection, data were cleaned and then analysed using appropriate statistical methods. A comparative chart for individual responses and time taken was made, and Descriptive Statistics was used to describe and summarize the data.

3. Results

The comparative chart shows that in Control Condition, Subjects 1, 4, and 5 reached a full criterion of 100% while solving the jumbled words, and took 31.80s, 30.14s, and 33.45s, respectively. Subject 2 showed 97.3% correctness in response, in 38.12s; and Subject 3 showed 89.3% correctness in response, in 42s. However, in the Experimental Condition, only Subjects 4 and 5 reached a full criterion of 100% while solving the jumbled words, and took 58s and 48.92s, respectively. Subject 1 showed 98% correctness in response, in 49.21s, Subject 2 showed 96% correctness in response, in 58.23s; and Subject 3 showed 88.5% correctness in response, in 64.23s.

Table 2. Comparative Table showing the individual percentage of correct responses and time take for Control Condition and Experimental Condition for different subjects.

Subjects	**Control Condition**		**Experimental Condition**	
	% of Correct Response	Time Taken (s)	% of Correct Response	Time Taken (s)
1	100%	31.80s	98%	49.21s
2	97.3%	38.12s	96%	58.23s
3	89.3%	42s	88.5%	64.23s
4	100%	30.14s	100%	58s
5	100%	33.45s	100%	48.92s

Descriptive Statistics shows that in Control Condition, the average percentage of correct response is 97.32%, and the average time taken is 35.10s. And in Experimental Condition, the average percentage of correct response is 96.5%, and the average time taken is 55.91s. Thus, percentage of correct responses decreased, and time taken to solve the jumbled words increased during the implementation of Situational Judgement Tests in the experimental condition.

Table 3. Descriptive Statistics showing the percentage of correct responses and time take for Control Condition and Experimental Condition for different subjects.

	Control Condition		**Experimental Condition**	
	% of Correct Response	Time Taken (s)	% of Correct Response	Time Taken (s)
Mean	97.32%	35.10s	96.5%	55.91s
SD	4.63	4.87	4.76	6.56

4. Discussion and Conclusion

The present experiment set out to explore the effect of Cognitive Load on Problem-Solving capacity of individuals; after analyzing the collected data, it was seen that both the percentage of correct responses, and time taken to solve the given problem, deteriorated during the introduction of Cognitive Load during the Experimental Condition. Hence, the Null Hypothesis was rejected and the Alternative Hypothesis was accepted. The results are in line with Chandler and Sweller's findings on the Cognitive Load Theory (1991).

Acknowledgements

The author appreciates all those who participated in the study and helped to facilitate the research process.

References

Sweller, J., & Chandler, P. (1991). Evidence for cognitive load theory. *Cognition and instruction*, *8*(4), 351-362.

Sweller, J. (2010). Cognitive load theory: Recent theoretical advances.