Jurnal Theorems (*The Original Reasearch Of Mathematics*)
Volume 11, Number 2, May 2026
URL: http://ejournal.unma.ac.id/index.php/th

e-ISSN: 2528-102X
p-ISSN: 2541-4321

COGNITIVE LOAD AND LEARNED HELPLESSNESS: EXAMINING THE PSYCHOLOGICAL CONSEQUENCES OF INSTRUCTIONAL DEMANDS

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Article Info:
Received 2026-01-01
Revised 2026-03-20
Accepted 2026-05-27

How to Cite:
Hartanto, Ahmad Iqbal., Jatisunda, Mohamad Gilar. (2026). Cognitive Load And Learned Helplessness: Examining the Psychological Consequences Of Instructional Demands. *Jurnal Theorems (The Original Research of Mathematics*, *11*(2), 138-151.

ABSTRACT

This study investigates the relationships between the dimensions of cognitive load—namely, intrinsic, extraneous, and germane—and learned helplessness among students. The study is grounded in the premise that students' learning difficulties may not arise solely from the inherent complexity of learning tasks but also from suboptimal instructional conditions that impose unnecessary cognitive demands, thereby contributing to learned helplessness. A quantitative correlational design was employed involving 150 students as research participants. Data were collected using a 40-item Likert-scale questionnaire ranging from 1 to 4. Instrument validity was established through Pearson product–moment analysis, with correlation coefficients ranging from 0.373 to 0.835 ($r > 0.160$), while reliability indices demonstrated satisfactory internal consistency, as indicated by Cronbach's alpha coefficients ranging from 0.797 to 0.919. Data normality was confirmed using the Kolmogorov–Smirnov test ($p > 0.05$). Pearson correlation analysis revealed that extraneous cognitive load exhibited a moderate positive association with learned helplessness ($r = 0.543$, $p < 0.001$), suggesting that externally induced cognitive burdens may substantially increase students' susceptibility to helpless cognitive and behavioral patterns. Intrinsic cognitive load demonstrated a weak positive relationship ($r = 0.247$, $p = 0.002$). In contrast, germane cognitive load showed a weak negative association ($r = -0.228$, $p = 0.005$), suggesting a potentially protective role in facilitating adaptive learning processes. These findings underscore the critical role of instructional design in regulating learners' cognitive demands and suggest that reducing unnecessary cognitive burden while fostering meaningful cognitive engagement may be an important strategy for mitigating learned helplessness in educational settings.

Keywords: Cognitive load, learned helplessness; cognitive engagement; instructional design; student learning

INTRODUCTION

In recent years, the quality of learning processes has become a major concern in educational research, particularly regarding how students cognitively and psychologically respond to instructional demands. Students' abilities or content mastery does not solely determine learning; rather, it is substantially shaped by the interaction between learners' cognitive resources and the instructional environments in which learning occurs. One influential framework for understanding such interactions is Cognitive Load Theory (CLT), which posits that learning effectiveness depends on how limited cognitive resources are distributed across intrinsic, extraneous, and germane cognitive load (Barbieri &

e-ISSN: 2528-102X
p-ISSN: 2541-4321

Rodrigues, 2025; Chen, Kalyuga, & Sweller, 2017; Greenberg & Zheng, 2022; Tugtekin & Odabasi, 2022). Although CLT has been extensively employed to improve instructional efficiency and optimize learning outcomes, its implications for students' psychological functioning remain insufficiently examined.

Within educational settings, one psychological phenomenon that warrants further attention is learned helplessness. Learned helplessness refers to a condition in which individuals perceive limited control over academic outcomes, resulting in diminished motivation, reduced persistence, and increased tendency to disengage from challenging learning situations (Duda & Joormann, 2022; Winterflood & Climie, 2020). Traditionally, learned helplessness has been conceptualized primarily as an outcome of repeated failure experiences, maladaptive attribution patterns, or negative self-beliefs (Ghasemi & Karimi, 2021). However, contemporary perspectives suggest that helpless responses may not solely emerge from individual characteristics but may also be influenced by contextual and instructional factors that impose excessive cognitive demands on learners (Evans et al., 2024). Such a perspective broadens the understanding of learned helplessness from an exclusively psychological construct toward a phenomenon potentially shaped by instructional design itself.

Existing studies have shown that different forms of cognitive load may exert distinct influences on learning experiences. High levels of extraneous cognitive load, often generated by poorly organized instructional materials, unnecessary information, or ineffective presentation formats, have been found to reduce learning efficiency and increase cognitive burden (Klepsch & Seufert, 2020; Sentz & Stefaniak, 2019). In contrast, germane cognitive load has been associated with productive learning processes involving schema construction and meaningful knowledge integration (Giang et al., 2024; Seufert et al., 2024). Nevertheless, most previous investigations have predominantly examined cognitive load in relation to traditional educational outcomes, such as academic achievement, retention, or learning performance. Comparatively little attention has been paid to its potential influence on students' psychological experiences during learning.

More importantly, two substantial gaps remain evident in the existing literature. First, empirical studies investigating the relationship between cognitive load and learned helplessness remain limited. Second, studies that simultaneously examine the differentiated roles of intrinsic, extraneous, and germane cognitive load in explaining learned helplessness are scarce, particularly within authentic classroom contexts involving student populations (Liu et al., 2022; Wang et al., 2025). Existing research has largely treated cognitive load as a mechanism for improving instructional efficiency, while overlooking its potential consequences for students' psychological well-being and adaptive learning behavior. This omission is theoretically important because different components of cognitive load may exert distinct influences on learners' motivational and emotional responses.

e-ISSN: 2528-102X
p-ISSN: 2541-4321

The present study addresses these limitations by integrating Cognitive Load Theory with the theoretical perspective of learned helplessness. Rather than examining cognitive load solely as a predictor of academic performance, this study conceptualizes cognitive load as a multidimensional construct that may also influence learners' psychological conditions. Specifically, this study investigates how intrinsic, extraneous, and germane cognitive load are associated with learned helplessness among students. The novelty of this study lies in three aspects: (1) extending the application of Cognitive Load Theory into the domain of psychological outcomes, (2) simultaneously examining the differentiated contributions of all cognitive load components toward learned helplessness, and (3) providing empirical evidence from authentic educational contexts. Through this integrated perspective, the study seeks to contribute to a more comprehensive understanding of learning processes by connecting cognitive efficiency with students' psychological well-being.

Accordingly, this study aims to examine the relationships between intrinsic, extraneous, and germane cognitive load and learned helplessness using a quantitative correlational approach. Understanding these relationships may provide important implications for designing learning environments that not only optimize learning effectiveness but also reduce psychological barriers that potentially hinder students' engagement and persistence.

METHODS

Research Design

This study employed a quantitative correlational design to examine the relationships between dimensions of cognitive load (intrinsic, extraneous, and germane) and learned helplessness among students (Hodge, 2020). A correlational approach was considered appropriate because the study sought to investigate the magnitude and direction of associations among naturally occurring variables without experimental manipulation. Consistent with the purpose of correlational research, the study focused on identifying patterns of relationships among variables rather than establishing causal effects (Creswell, 2017).

Participants and Sampling Procedures

The study involved students enrolled in formal educational settings as the target population. A total of 149 participants were recruited using non-probability convenience sampling based on accessibility and participants' willingness to participate in the study. Although probability sampling methods may provide stronger generalizability, convenience sampling is frequently employed in educational research where access to participants is constrained, and exploratory relationships among constructs are investigated (Golzar et al., 2022; Vehovar et al., 2016). Participants were required to meet two inclusion criteria: (a) active participation in the learning process during the period of data collection and (b) willingness to complete the questionnaire voluntarily. Responses with substantial missing data or

e-ISSN: 2528-102X
p-ISSN: 2541-4321

incomplete questionnaires were excluded prior to analysis to maintain data integrity and ensure the reliability of the findings.

Research Instruments

Data were collected using a structured self-report questionnaire employing a four-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*) (Nur Islamiati & Nasruddin, 2020). The instrument comprised 40 items distributed equally across four constructs, namely intrinsic cognitive load, extraneous cognitive load, germane cognitive load, and learned helplessness, with each construct represented by ten items. The cognitive load dimensions were operationalized according to Cognitive Load Theory, whereas learned helplessness was operationalized based on psychological indicators associated with motivational decline and maladaptive responses to learning challenges. Composite scores for each construct were calculated by aggregating item responses, with higher scores indicating stronger levels of the corresponding construct. Instrument validity was assessed using Pearson product–moment correlation analysis to evaluate item-total relationships. Items were considered valid if the obtained correlation coefficients exceeded the critical threshold. Internal consistency reliability was assessed using Cronbach's alpha coefficients, with values greater than .70 indicating acceptable reliability standards for educational research instruments.

Variables and Operational Definitions

The present study included three independent variables and one dependent variable. Intrinsic cognitive load referred to cognitive demands generated by the inherent complexity and interactivity of learning materials and was measured through students' perceptions of content difficulty. Extraneous cognitive load refers to the cognitive burden arising from ineffective instructional presentation, including unclear explanations and irrelevant information. Germane cognitive load referred to cognitive effort directed toward meaningful processing activities, including schema construction, knowledge organization, and information integration (Klepsch & Seufert, 2020). The dependent variable, learned helplessness, was defined as a psychological condition characterized by reduced motivation, diminished persistence, and a tendency to disengage when confronted with learning difficulties (Cobos-Sanchiz et al., 2022).

Data Collection Procedures

Data collection was conducted during the learning process by administering questionnaires to participating students. Prior to administration, participants received standardized instructions regarding the study's purpose and the procedures for completing the instrument. Data collection followed several stages, including instrument preparation and validation, questionnaire administration, completion of responses within the allocated period, and data screening to identify incomplete or invalid responses. A standardized administration process was maintained to ensure consistency across participants and minimize procedural bias.

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Data Analysis

Data analysis involved both descriptive and inferential statistical procedures. Descriptive statistics, including means and standard deviations, were calculated to summarize the characteristics and distributions of the variables under investigation. Prior to hypothesis testing, the assumption of normality was examined using the Kolmogorov–Smirnov test (Sayili & Gunver, 2025). Following confirmation of normal distribution assumptions, Pearson product–moment correlation analysis was conducted to determine the strength and direction of relationships between cognitive load dimensions and learned helplessness (Arslan & Şahin, 2024). Statistical significance was set at $\alpha = .05$. All analyses were performed using appropriate statistical software for quantitative data analysis.

Ethical Considerations

This study adhered to established ethical principles governing educational research involving human participants. Participants were informed of the purpose and procedures of the study and that participation was entirely voluntary. Informed consent was obtained prior to data collection. To protect participants' privacy, responses were collected anonymously and all data were treated confidentially. Furthermore, the study ensured that participation involved no foreseeable physical or psychological risks.

FINDINGS

Participant Characteristics and Data Screening

A total of 150 students participated in the study and completed the questionnaire. All returned responses met the inclusion criteria and were retained for analysis, resulting in a complete response rate with no missing data identified during screening. Therefore, the dataset was considered suitable for subsequent statistical analyses.

Instrument Validity Results

Prior to conducting the primary analyses, item validity was examined to determine whether the questionnaire items adequately represented the intended constructs. Pearson product–moment correlation analysis was employed by comparing the obtained item correlation values (*r-count*) with the critical value (*r-table* = 0.160).

Table 1. Instrument Validity Results

Variable	Range of r-count	r-table	Valid Items
Intrinsic Cognitive Load	0.373–0.696	0.160	10
Extraneous Cognitive Load	0.638–0.740	0.160	10
Germane Cognitive Load	0.494–0.692	0.160	10
Learned Helplessness	0.575–0.835	0.160	10

e-ISSN: 2528-102X
p-ISSN: 2541-4321

The results presented in Table 1 indicate that all item-total correlation coefficients exceeded the critical threshold, ranging from 0.373 to 0.835. These findings demonstrate that all questionnaire items adequately represented their corresponding constructs and therefore met the validity criteria required for subsequent analyses.

Instrument Reliability Results

Following validity assessment, reliability analysis was conducted to evaluate the instrument's internal consistency using Cronbach's alpha coefficients.

Table 2. Reliability Test Results

Variable	Cronbach's Alpha	Criteria	Interpretation
Intrinsic Cognitive Load	0.797	>0.70	Reliable
Extraneous Cognitive Load	0.871	>0.70	Reliable
Germane Cognitive Load	0.807	>0.70	Reliable
Learned Helplessness	0.919	>0.70	Reliable

As shown in Table 2, Cronbach's alpha values ranged from 0.797 to 0.919, exceeding the recommended threshold of 0.70. These values indicate satisfactory to high internal consistency across all constructs, suggesting that the instrument possessed acceptable reliability for measuring the variables under investigation.

Descriptive Statistics and Normality Assessment

Prior to inferential analysis, descriptive statistics and normality testing were conducted to examine the distributional characteristics of the variables.

Table 3. Descriptive Statistics and Normality Test Results

Variable	Mean	SD	KS Statistic	Sig.
Intrinsic Load	3.157	0.448	0.093	0.135
Extraneous Load	2.249	0.579	0.085	0.215
Germane Load	2.942	0.437	0.091	0.152
Learned Helplessness	2.124	0.676	0.063	0.152

As shown in Table 3, all significance values exceeded the .05 threshold, indicating that the variables met the assumption of normality and were therefore appropriate for parametric statistical procedures. Furthermore, the descriptive findings revealed variation across the measured constructs. Intrinsic cognitive load had the highest mean score (M = 3.157, SD = 0.448), whereas learned

e-ISSN: 2528-102X
p-ISSN: 2541-4321

helplessness had the lowest (M = 2.124, SD = 0.676). The observed standard deviations suggest moderate variability among participants while maintaining adequate consistency across responses.

Pearson Correlation Analysis

Pearson product–moment correlation analysis was conducted to examine the relationships between the dimensions of cognitive load and learned helplessness.

Table 4. Pearson Correlation Results

Variables	Intrinsic Load	Extraneous Load	Germane Load	Learned Helplessness
Intrinsic Load	1	0.261	0.247	0.247
Extraneous Load	0.261	1	-0.074	0.543
Germane Load	0.247	-0.074	1	-0.228
Learned Helplessness	0.247	0.543	-0.228	1

The correlation results presented in Table 4 reveal distinct patterns across the cognitive load dimensions. Intrinsic cognitive load exhibited a weak but statistically significant positive relationship with learned helplessness (r = .247, p = .002), suggesting that increased perceived complexity of learning materials was associated with greater tendencies toward helpless responses. Extraneous cognitive load demonstrated the strongest association with learned helplessness (r = .543, p < .001), representing a moderate positive relationship. In contrast, germane cognitive load showed a weak negative relationship with learned helplessness (r = −.228, p = .005), indicating that greater engagement in meaningful cognitive processing was associated with lower tendencies toward learned helplessness.

Among all observed relationships, extraneous cognitive load yielded the highest correlation coefficient, suggesting that externally imposed cognitive burden was more strongly associated with learned helplessness than cognitive demands arising from task complexity. The relationship between extraneous and germane cognitive load was negative but not statistically significant (r = −.074, p = .372), indicating no meaningful linear association in the present dataset.

DISCUSSION

The present study examined the relationships between dimensions of cognitive load and learned helplessness among students, revealing differentiated patterns across intrinsic, extraneous, and germane cognitive load. Among the three dimensions, extraneous cognitive load emerged as the strongest positive correlate of learned helplessness, whereas intrinsic cognitive load demonstrated a weaker positive relationship and germane cognitive load exhibited a negative association. These findings suggest that students' psychological responses to learning may be influenced not only by the complexity

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p-ISSN: 2541-4321

of learning materials but also by the quality and organization of instructional conditions surrounding learning processes.

The most salient finding of the present study concerns the moderate positive relationship identified between extraneous cognitive load and learned helplessness. According to Cognitive Load Theory, extraneous load refers to cognitive demands generated by ineffective instructional design and therefore does not contribute directly to learning (Paas et al., 2003). Excessive cognitive resources devoted to processing irrelevant information, confusing presentation structures, or unclear instructional guidance may reduce the cognitive capacity available for meaningful learning activities. This interpretation aligns with previous perspectives suggesting that learner control and instructional features may impose additional cognitive burden when not appropriately designed, thereby transforming potentially productive cognitive effort into unnecessary processing demands (Vandewaetere & Clarebout, 2013).

However, the present findings further suggest that the implications of extraneous cognitive load may extend beyond cognitive inefficiency itself toward broader psychological consequences. Recent evidence has indicated that excessive cognitive burden may negatively affect learners' psychological functioning, including reductions in self-efficacy, motivational engagement, and perceived learning effectiveness (Gupta & Prashar, 2025; Tzafilkou et al., 2021). Similarly, Brooks and Shell (2006) argued that cognitive demands and motivational processes are closely interconnected through working memory mechanisms, suggesting that excessive cognitive burden may interfere not only with cognitive performance but also with learners' motivational resources.

From an attributional perspective, the relationship between extraneous cognitive load and learned helplessness may be explained through students' interpretations of learning difficulties. Learned helplessness theory suggests that repeated experiences of uncontrollable outcomes can lead individuals to develop passive responses and diminished expectations of success (Munton, 1985). When students repeatedly encounter difficulties caused by instructional conditions rather than by actual limitations in their capabilities, they may misattribute such difficulties as evidence of insufficient competence. Dweck and Goetz (2018) emphasized that attributional patterns play an important role in determining whether individuals perceive difficulties as manageable challenges or as indicators of personal inadequacy. Consequently, externally imposed cognitive burden may gradually reinforce maladaptive beliefs regarding students' ability to succeed, thereby increasing tendencies toward learned helplessness.

In contrast, intrinsic cognitive load demonstrated a relatively weaker positive relationship with learned helplessness. This finding is theoretically meaningful because intrinsic load reflects the inherent complexity and interactivity of learning content and therefore cannot be entirely eliminated (Paas et al., 2003). The comparatively weaker relationship observed in the present study suggests that complexity itself may not necessarily trigger maladaptive psychological responses. Rather, students may tolerate substantial levels of cognitive complexity when instructional support mechanisms are appropriately

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structured. This interpretation is consistent with findings indicating that learners with stronger self-efficacy perceptions are generally better able to manage cognitively demanding learning situations (Vasile et al., 2011; Jung et al., 2025).

Another important finding concerns the negative association identified between germane cognitive load and learned helplessness. Germane cognitive load reflects productive cognitive effort directed toward schema construction, knowledge organization, and meaningful information processing (Paas et al., 2003). The findings suggest that students who actively organize and integrate learning materials may be less susceptible to developing helpless responses. This interpretation is consistent with recent work highlighting the dynamic interaction among cognitive load, learner resources, and self-regulatory processes (Seufert et al., 2024). Productive cognitive engagement may strengthen students' perceptions of competence and control, thereby promoting adaptive responses when encountering learning difficulties.

When considered alongside existing research, the present findings help extend Cognitive Load Theory beyond its traditional emphasis on cognitive efficiency and academic performance. Previous studies have predominantly focused on how cognitive load influences learning outcomes such as achievement, retention, and problem-solving performance (Ginns & Leppink, 2019). Comparatively limited attention has been paid to understanding its implications for students' psychological adaptation during learning. Furthermore, recent theoretical developments have emphasized the need to examine cognitive load within broader motivational frameworks rather than treating cognitive and motivational variables as separate domains (Evans et al., 2024). The present findings support this perspective by suggesting that cognitive demands may function not only as information-processing constraints but also as antecedents of psychological responses.

The theoretical contribution of this study, therefore, lies not merely in combining Cognitive Load Theory with learned helplessness theory, but in demonstrating a possible mechanism through which instructional conditions may influence psychological adaptation. The findings indicate that learning difficulties may emerge through interactions among cognitive burden, motivational resources, and students' perceptions of competence and control. Such a perspective provides a more comprehensive framework for understanding learning difficulties by integrating cognitive, emotional, and motivational dimensions. From a practical perspective, the findings underscore the importance of instructional environments that minimize unnecessary cognitive demands while promoting meaningful cognitive engagement. Reducing extraneous cognitive load through clear explanations, systematic information organization, and elimination of irrelevant instructional elements may help reduce students' vulnerability to helpless responses. Simultaneously, instructional strategies emphasizing active processing, collaborative learning, and reflective activities may strengthen germane cognitive load and facilitate adaptive learning experiences.

e-ISSN: 2528-102X
p-ISSN: 2541-4321

Several limitations should be acknowledged. First, the correlational nature of the present study limits causal interpretation of the observed relationships. Second, self-reported measures may not fully capture actual cognitive processing mechanisms. Future investigations may benefit from integrating objective indicators of cognitive load, including physiological and eye-tracking measures, which have increasingly been recognized as valuable approaches for assessing cognitive processing in learning environments (Souchet et al., 2022). Additionally, longitudinal and experimental approaches may provide stronger evidence regarding causal pathways linking cognitive load and learned helplessness. The findings suggest that cognitive load dimensions influence not only students' learning processes but also their psychological adaptation during learning activities. Learned helplessness appears to be associated more strongly with unnecessary cognitive burden than with content complexity itself. Consequently, instructional design may play a critical role not only in supporting learning effectiveness but also in fostering students' psychological well-being.

CONCLUSION AND SUGGESTION

This study examined the relationships between intrinsic, extraneous, and germane cognitive load and learned helplessness among students. The findings revealed differentiated patterns across the cognitive load dimensions. Extraneous cognitive load demonstrated the strongest positive association with learned helplessness, indicating that unnecessary cognitive demands imposed by instructional conditions may substantially increase students' susceptibility to maladaptive psychological responses. Intrinsic cognitive load exhibited a weaker positive relationship, suggesting that content complexity alone may not necessarily lead to helplessness when appropriate instructional support is available. In contrast, germane cognitive load showed a negative association, indicating that meaningful cognitive engagement may function as a protective factor against learned helplessness. These findings contribute to the literature by extending the application of Cognitive Load Theory beyond its traditional emphasis on learning efficiency and academic performance toward psychological outcomes in learning contexts. The study suggests that cognitive demands may influence not only information processing but also students' perceptions of competence, control, and adaptation during learning activities. By integrating Cognitive Load Theory with the perspective of learned helplessness, the present study provides a broader understanding of learning processes that incorporates cognitive, motivational, and psychological dimensions. From an educational perspective, the findings highlight the importance of instructional environments that reduce unnecessary cognitive burden while promoting meaningful engagement with learning materials. Effective instructional design may therefore play a critical role not only in improving learning effectiveness but also in supporting students' psychological well-being and adaptive learning experiences. Future research may investigate the causal mechanisms underlying these relationships through experimental or longitudinal approaches and employ more objective measures of

e-ISSN: 2528-102X
p-ISSN: 2541-4321

cognitive load to deepen understanding of the interaction between cognitive and psychological processes.

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