*Original Research Article*

Academic pressure and Brain Power: The Correlation between Emotional Intelligence, Stress, and Cognitive Load

ABSTRACT

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| Understanding cognitive load and emotional intelligence in the teaching-learning process is important because they are interrelated in shaping effective and meaningful learning experiences for students. This research aims to determine the correlation between emotional intelligence and academic stress levels on students' cognitive load in biology subjects at *SMA Negeri 4 Tasikmalaya, Indonesia*. The research was carried out under correlational method. The collected data were analyzed through bivariate and multivariate correlations. The results show a significant correlation between emotional intelligence and academic stress levels on students' cognitive load with a correlation coefficient (*r = 0.957*), indicating a strong relationship. In addition*, the coefficient of determination (R2=0.916) indicates that 91.6% of the variance in cognitive load can be explained by the combined influence of emotional intelligence and academic stress levels. The remaining 8.4% of the variance is attributable to other factors not examined in this study*. In conclusion, this research finds a correlation between emotional intelligence and academic stress levels on students' cognitive load in biology. |

*Keywords: academic pressure, academic stress, biology, cognitive behavior, emotional intelligence, education*

1. INTRODUCTION

Emotional intelligence (EI) among students has garnered increasing attention in educational research. This shift stems from the recognition that academic achievement hinges not solely on intellectual intelligence (IQ), but also on the adeptness in handling emotions and interpersonal dynamics (Cherniss et al., 2010). The highest contribution of IQ to factors determining success is only about 20%, while the remaining 80% comes from other factors that define success in life (Goleman, 2020). Consequently, many scientists strive to identify other aspects of intelligence that are considered more essential. Emotional intelligence is the ability to recognize someone’s own feelings and those of others, and to manage emotions well within ourselves and in our relationships with others (Goleman, 2000).

The ability of emotional intelligence can help individuals manage cognitive strategies more effectively (Oktarisa et al., 2023).Emotional intelligence significantly impacts students' cognitive processes, as students who can manage their emotions can enhance their cognitive strategies (Arsy & Annisa, 2022). High cognitive load can affect students' and learners' ability to process information and working memory, thereby increasing the level of academic stress experienced (Nadialista Kurniawan, 2021). Academic stress is defined as the pressures faced by students related to school, perceived negatively, and impacting their physical health, mental health, and learning performance (Carveth et al., 1996; Misra & Castillo, 2004). Characteristics of students with high emotional intelligence include the ability to recognize and understand their own emotions well (Sulastri et al., 2022). They can identify the feelings they experience and understand their impact on behavior and thoughts. Students with high emotional intelligence can express their emotions appropriately in various situations (Mustofa et al., 2022). They can show emotions in a balanced manner and contextually, and they are also able to read and respond to others' emotions with empathy and understanding. Students need to regulate their emotions well to focus on their learning tasks and minimize emotional distractions (Mustofa et al., 2019). Students must manage their time and activities effectively. Each individual has different levels of cognitive load, which can be caused by various factors, including the number of lessons, the difficulty level of the material, the learning environment such as time and place, the complexity of the material, emotions, and self-efficacy (Nurwanda et al., 2020).

The situation you described aligns with the phenomena observed during field observations. Among the issues identified are students complaining that tasks assigned by teachers are too difficult due to the volume of material or concepts covered. Additionally, student express concerns about having to complete numerous tasks simultaneously. Through interviews conducted eith both biology teachers and students, the author identifies recurring patterns of late assigment submissions, inconsistents calss attendance, and passive participation in discursive classroom activities. Throughout the learning process, students frequently complain that tasks are too challenging, sometimes feeling lazy or losing motivation to study. However, an interesting finding emerges: despite these challenges, students exhibit effective emotional management. They are capable of completing tasks even when they find them difficult and complex. Given this situation, it's worth exploring whether there's a correlation between students' ability to manage emotions and the perceived burden of tasks. Additionally, it's essential to investigate how academic stress impacts their ability to handle these overwhelming tasks.

There are previous studies relevant to this research. A study conducted by (Young et al., 2021) demonstrated that there is a positive effect of emotional intelligence on cognitive load. They found that higher levels of emotional intelligence can reduce intrinsic, extrinsic, and germane cognitive load. Setyaji (2021) suggested a negative relationship between emotional intelligence and academic stress, with emotional intelligence contributing 26.6% to the reduction of academic stress. Additionally, research by Nadialista Kurniawan (2021) indicated a significant role of self-efficacy in cognitive load and academic stress.

Various descriptions have been presented, leading to the conclusion that students with good emotional intelligence are capable of managing the pressure and academic burden they face. However, previous research has mainly focused on only two variables, leaving the investigation of the third variable relatively unexplored. These three variables present an opportunity for deeper examination regarding the correlation between emotional intelligence, academic stress levels, and cognitive load in the context of biology subjects. This study aims to determine the relationship between emotional intelligence and academic stress levels with cognitive load. Therefore, based on these descriptions, it is necessary to employ a correlational method to assess the extent of the contribution of emotional intelligence and academic stress levels to students' cognitive burden.

2. material and methods

**2.1 Research design and Participants**

This research employs a correlational method with a multiple correlation paradigm involving two independent variables. The sample comprises all members of Class XI, with respondents selected based on their engagement with complex and intricate subject matter.

**2.2 Sampling**

This study employs a total sampling technique, where in all members of the population are included as study participants, to enhance the accuracy of research findings (Fraenkel & Wallen, 2006; Sugiyono, 2016).

**2.3 Instrumentation**

This study employed three psychometric scales: the Emotional Intelligence Scale, the Academic Stress Scale, and the Cognitive Load Scale. The author adopted each exiting scale in its original form without item modification, followed by revalidation procedures to ensure measurement appropriateness given differing sample characteristics form the original validation studies. The Emotional Intelligence Scale was constructed based on Goleman's (1995) five-dimensional model, operationalized through 44 Likert-type items measuring self-awareness, self-management, self-motivation, social skills, and empathy. The Academic Stress Scale, adapted from (Sun et al., 2011a), comprised 16 Likert-scale items assessing five domains: study pressure, workload, grade-related anxiety, self-expectation, and despondency. The Cognitive Load Scale, modified from Leppink et al (2014), evaluated three components through 20 Likert-type items: intrinsic cognitive load, extraneous cognitive load, and germane cognitive load.

**2.4 Data collection procedure**

The data collection process was conducted through the administration of structured questionnaires to 190 participants who had previously provided informed consent. Three psychometric instruments were employed: (1) a 44-item Emotional Intelligence Scale, (2) a 20-item Cognitive Load Questionnaire, and (3) a 16-item Academic Stress Scale. Consistent with MacCann et al (2020) theoretical framework, the emotional intelligence measure - demonstrating trait-like stability and lower susceptibility to response bias - was administered first. Subsequent administration of the state-like Academic Stress Scale Sun et, al. (2011b) allowed for assessment of stress levels potentially moderated by previously measured emotional awareness. The Cognitive Load Scale was deliberately positioned last in the sequence due to its contextual sensitivity and vulnerability to measurement bias (Leppink et al., 2014). This hierarchical administration protocol follows Podsakoff et al (2003) methodological recommendation that stable trait measures should precede state-like or situational assessments to minimize common method variance in self-report data.

**2.2 Prosedure and Data Analysis**

Before participating, respondents were briefed on the confidentiality and anonymity of their responses. The questionnaires were distributed online using Google Forms, and the collected data were analyzed using Staistical Package for Social Science 25 for Windows to assess the validity and reliability of the questionnaires. Subsequently, normality was tested using the Kolmogorov-Smirnov test, linearity was tested using tests for linearity, multicollinearity was assessed,

3. results and discussion

3.2 Validity and Reliability

Table 1. *Validity of cognitive load scale*

| *Items*  | *Factor loading* | *Item*  | *Factor loading*  |
| --- | --- | --- | --- |
| Item 1 | 0,553 | Item 11 | 0,626 |
| Item 2 | 0,605 | Item 12 | 0,628 |
| Item 3 | 0,800 | Item 13 | 0,755 |
| Item 4 | 0,711 | Item 14 | 0,818 |
| Item 5  | 0,750 | Item 15 | 0,645 |
| Item 6 | 0,844 | Item 16 | 0,727 |
| Item 7 | 0,653 | Item 17 | 0,669 |
| Item 8 | 0,690 | Item 18 | 0,622 |
| Item 9 | 0,694 | Item 19 | 0,621 |
| Item 10 | 0,666 | Item 20 | 0,581 |

Table 2 *Validity of emotional intelligence scale*

| *Items*  | *Factor loading* | *Item*  | *Factor loading*  |
| --- | --- | --- | --- |
| Item 1 | 0,445 | Item 23 | 0,460 |
| Item 2 | 0,415 | Item 24 | 0,654 |
| Item 3 | 0,513 | Item 25 | 0,550 |
| Item 4 | 0,517 | Item 26 | 0,507 |
| Item 5 | 0,500 | Item 27 | 0,506 |
| Item 6 | 0,511 | Item 28 | 0,421 |
| Item 7 | 0,546 | Item 29 | 0,466 |
| Item 8 | 0,481 | Item 30 | 0,557 |
| Item 9 | 0,474 | Item 31 | 0,466 |
| Item 10 | 0,532 | Item 32 | 0,375 |
| Item 11 | 0,516 | Item 33 | 0,504 |
| Item 12 | 0,515 | Item 34 | 0,557 |
| Item 13 | 0,469 | Item 35 | 0,522 |
| Item 14 | 0,556 | Item 36 | 0,556 |
| Item 15 | 0,585 | Item 37 | 0,526 |
| Item 16 | 0,455 | Item 38 | 0,630 |
| Item 17 | 0,528 | Item 39 | 0,544 |
| Item 18 | 0,514 | Item 40 | 0,574 |
| Item 19 | 0,547 | Item 41 | 0,496 |
| Item 20 | 0,512 | Item 42 | 0,562 |
| Item 21 | 0,454 | Item 43 | 0,626 |
| Item 22 | 0,454 | Item 44 | 0,504 |

Table 3. *Validity of the academic stress level scale*

|  |  |  |  |
| --- | --- | --- | --- |
| *Items*  | *Factor loading* | *Item*  | *Factor loading*  |
| Item 1 | 0,568 | Item 9 | 0,738 |
| Item 2 | 0,807 | Item 10 | 0,776 |
| Item 3 | 0,565 | Item 11 | 0,654 |
| Item 4 | 0,524 | Item 12 | 0,580 |
| Item 5 | 0,624 | Item 13 | 0,661 |
| Item 6 | 0,666 | Item 14 | 0,446 |
| Item 7 | 0,642 | Item 15 | 0,656 |
| Item 8 | 0,703 | Item 16 | 0,546 |

 Based on statistic (Table 1, Table 2, Table 3), all items in the cognitive load scale are valid. This conclusion is drawn from the fact that the r-value for each item is above 0.320 (Hair et al., 2019; Montgomery, 2017; Purwanto et al., 2021). The validity test for each questionnaire item in this study was conducted with the assistance of SPSS version 25 for Windows.

Table 4. Construct reliability

|  |  |
| --- | --- |
|  | Cronbach’s Alpha |
| cognitive load | 0,934 |
| Emotional intelligence | 0,938 |
| Academic stress levels | 0,902 |

Cronbach's alpha is commonly used to assess the internal consistency of a scale. Generally, a Cronbach's alpha value above 0.7 is considered acceptable (Kline, 2000). As shown in Table 3, the Cronbach's alpha values for each subscale consistently exceed 0.90, ranging from 0.87 to 0.93. This indicates that the scales demonstrate reliable consistency.

**3.2 Correlation**

*Table 5 conclusions of the results of the correlation test of emotional intelligence and academic stress levels to cognitive load*

|  |
| --- |
| **Model Summary** |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics |
| R Square Change | F Change | df1 | df2 | Sig. F Change |
| 1 | .957a | .916 | .915 | 6.834 | .916 | 1013.147 | 2 | 187 | .000 |
| a. Predictors: (Constant), academic stress levels emotional intelligence |

The analysis indicates a significant correlation between emotional intelligence and academic stress levels on cognitive load, with a significance value (p-value) of 0.000. Additionally, the correlation coefficient R is found to be 0.957, and the coefficient of determination R2 0.916, or 91.6%. This result demonstrates that the variables emotional intelligence and academic stress levels contribute 91.6% to the cognitive load, while the remaining 8.4% is attributed to other factors.

The results of this study show a correlation between emotional intelligence and academic stress levels with cognitive load in the subject of biology. This study is significant as it can identify the role of emotional intelligence in managing stress and cognitive load, which can ultimately be used to design strategies and intervention programs to help students cope with academic pressure and enhance their performance and well-being. The empirical data generated can also support the development of more holistic and student-centric educational policies.

Using a significance level of 5%, the hypothesis conclusion is to reject the null hypothesis (Ho) because 0.000 ≤ 0.005. This indicates a significant correlation between emotional intelligence and academic stress levels with cognitive load. The values ​​of each indicator can be seen in (**Figure 1, Figure 2,** and **Figure 3**).

**Figure 1.** Average Students' Cognitive load questionnaire Scores on Each Swaller Indicator

**Figure 1** shows the average scores for each indicator of cognitive load. Based on the research conducted on 190 students, the intrinsic cognitive load indicator has the highest average score, which is 5.84 out of all cognitive load indicators. These results indicate that students' reception of the complexity of the biology subject matter is not optimal. This occurs when the cognitive process in the working memory of students is hindered because students require a deeper understanding to learn the concepts and scientific terms in biology. Considering the subject matter, biology is less observable directly because most concepts in biology are related to processes or structures that cannot be directly observed or are too small to be observed with the naked eye. As a result, the intrinsic load on students in the biology subject is quite high.

The results of this study indicate that students have not yet reached an optimal level in receiving and processing information about the complexity of the reproductive system material in biology lessons. Consequently, the intrinsic cognitive load of students in biology is quite high. If students' working memory capacity exceeds its limit, they cannot acquire and process learning materials optimally (Pertiwi, 2020). This situation causes students to feel overwhelmed, and in such scenarios, it can be said that students are experiencing cognitive load. Cognitive load refers to the amount of mental or cognitive effort required by an individual to complete a task or understand a concept. This concept encompasses information processing, problem-solving, and the overall mental effort needed by individuals in a learning context (de Jong, 2010). which explain that when the intrinsic cognitive load of a subject matter is high and the information is well-received by students, cognitive processes in working memory will proceed smoothly (Wahyuni & Cahyani, 2021). onversely, if the intrinsic cognitive load of the material is light but the information is poorly presented—such as being too voluminous or unsystematic—the cognitive processes in working memory will slow down or halt. If students' working memory capacity is exceeded, they cannot efficiently acquire and process learning materials. This situation leads to students feeling overwhelmed, and in such scenarios, it can be concluded that they are experiencing cognitive load (Pertiwi, 2020).

**Figure 2.** Average Students' Emotional Intelligence Questionnaire Scores on Each Goleman Indicator

**Figure 2** presents a list of the total scores per indicator on emotional intelligence. Based on the figure, it can be seen that the highest score is found in the self-awareness and social skill indicators, with an average score of 3.19 based on the overall average per indicator. Meanwhile, the lowest score is found in the second indicator, self-motivation, with an average score of 2.91 based on the overall average indicator.

The first indicator, self-awareness, had a high average score of 3.19 among all the emotional intelligence indicators, self-awareness is the ability to recognize one's own feelings as they occur Daud (in Siregar *et.al* 2019). In this study, self-awareness includes recognizing and feeling one's own emotions, understanding the feelings that arise, and recognizing the influence of these feelings on actions. The findings indicate that students have a good understanding of what makes them angry and are aware that being too shy to ask questions can hinder the learning process. This suggests that the students' self-awareness is quite good. This suggests that the students' self-awareness is quite good. Who state that an individual is said to have high self-awareness if they can express their emotions well. (Lestari et al., 2019).

The second indicator, self-management, had the lowest score among all emotional intelligence indicators, with an average score of 2.91. This result indicates that students' ability to manage their own emotions still needs improvement. This study highlights the importance for students to handle stress, manage negative emotions, and remain focused on their goals. The ability to manage emotions is crucial because students need emotional regulation skills to handle emotional pressure and respond appropriately to various situations.

Students who can manage their emotions are better able to regulate their emotional responses, such as dealing with stress when facing challenges or difficulties in completing tasks and overcoming negative emotions, particularly during the learning process. This finding aligns with the research by (Mustofa et al., 2019), which suggests that students need to regulate their emotions well to focus on their learning objectives and minimize emotional distractions. Therefore, enhancing self-management skills in emotional regulation is vital in education, and educators should give special attention and support to help students develop these skills. By doing so, students will be better equipped to face learning challenges effectively and achieve better academic and emotional outcomes.

**Figure 3.** Average Students' Academic Stress Level Questionnaire Scores on Each Sun Jiandong Indicator

The first indicator, pressure from study, had the highest average score of 3.49. The results of this study indicate that some students experience significant learning pressure, characterized by difficulty focusing on biology study materials and completing assigned tasks. Students also face challenges in understanding the material during the learning process, leading to decreased motivation to learn. The negative impact of learning pressure on students' biology education can result in a decline in their learning quality (Sahrazad et al., 2021). When students struggle to focus on study materials and assignments, it can hinder their ability to effectively absorb information, which subsequently affects their motivation (Riyanti, 2024). Even though students may have a strong internal drive, exposure to excessive pressure can make them feel overwhelmed and demotivated (Seto et al., 2020). Moreover, the pressure experienced by students can also stem from their environment, such as parental pressure. Some students feel that their parents exert pressure on them if their academic performance is unsatisfactory. This aligns with the research by (Zheng et al., 2023), which found that parental pressure interacts with internal pressure from the students themselves, affecting their learning process and performance. Indicates that low initiative and motivation due to learning pressure can decrease the quality of students' learning experiences (Hutagalung & Samarinda, 2019).

The fifth indicator, despondency, had the lowest average score of all the academic stress indicators, with an average score of 2.40. The results of this study indicate that students experience despondency when they cannot achieve their desired targets. Students easily give up when they cannot keep up with the teaching-learning process involving complex and challenging material. Despondency arises when students feel incapable of achieving their targets or following the learning process effectively, particularly when faced with complex and difficult material. Despondency can be a significant barrier to learning as it may cause students to give up and lose their motivation to continue studying. Which indicates that student despondency can hinder learning and result in a loss of motivation (Yang et al., 2019). Therefore, it is crucial for teachers to identify and address despondency effectively. This can be done by providing emotional and academic support to students, helping them develop healthy coping strategies, and creating an inclusive and supportive learning environment (Wirahardi et al., 2022). By addressing despondency and rebuilding students' motivation, they can feel more confident and better equipped to face learning challenges.

The strong correlations between emotional intelligence and academic stress levels on cognitive load among students in biology subjects, as well as the contributions of each variable to cognitive load, cannot be overlooked, as each variable plays a significant role. Emotional intelligence is associated with students' ability to manage emotions within themselves and others, utilizing them to achieve success and learning goals (Gkintoni et al., 2023; Shafait et al., 2021). This involves emotional awareness, emotion management, self-motivation, empathy, and building social relationships. High emotional intelligence leads students to regulate their emotions effectively to focus on learning tasks and minimize emotional distractions (Mustofa et al., 2019). High emotional intelligence helps students maintain learning consistency, even when facing challenges or failures(Ghimby, 2024; Quílez-Robres et al., 2023).

Meanwhile, academic stress levels refer to the condition resulting from students' interaction with their environment (Andiarna, 2020). Stress related to academics includes school-related factors, curriculum, teachers, examination methods, and assessments that become stressors for students, which are perceived as threatening and disruptive, exceeding students' adaptive resources. Academic stress occurs when students perceive that their abilities cannot meet the demands of the environment, leading to internal pressure. Academic stress can affect various aspects of students' lives, including their mental and physical well-being. Its impacts can encompass decreased motivation to learn, increased symptoms of anxiety, depression, as well as unhealthy sleep patterns and eating habits. Moreover, academic stress can also influence students' social relationships with peers and family, as well as their overall academic performance. Therefore, it is important for educational institutions and relevant individuals to identify and manage academic stress effectively to support the holistic well-being of students.

 These three factors complement each other and are interconnected. High emotional intelligence possessed by students can reduce cognitive load. Meanwhile, low academic stress levels also decrease students' cognitive load. emotional intelligence can help individuals manage cognitive strategies more effectively (Oktarisa et al., 2023). Emotional intelligence has a significant impact on students' cognitive processes; students who can manage their emotions can enhance cognitive strategies by influencing their emotional balance and mental well-being (Furnham, 2016) . Furthermore, research also indicates that the ability to understand and regulate emotions not only affects cognitive aspects but also interpersonal relationships. Students with high levels of emotional intelligence tend to be better at interacting with others, handling conflicts, and building healthy correlations (Cherniss et al., 2010; Jung et al., 2019). This suggests that the development of emotional intelligence is not only relevant in an academic context but also has implications for students' everyday lives and social interactions.

4. Conclusion

Based on the research conducated at SMA Negeri 4 Tasikmalaya, Indonesia. The analysis reveals that emotional intelligence and academic stress levels significanlty influence that students cognitive load. The findings demonstrate a robuts correlation between these variables, with emotional intelligence exhibiting particularly strong predictive capacity for cognitive load. This research can provide a better understanding of how non-cognitive factors, such as emotional intelligence, affect students' cognitive performance in specific contexts, such as biology subjects. The findings from this research can serve as a basis for the development of more holistic learning strategies, considering both the cognitive and emotional aspects of students simultaneously. Moreover, the variable of academic stress levels also needs to be considered in this context. Academic stress can act as a mediator between emotional intelligence and cognitive load. The research indicates that high levels of academic stress can increase cognitive load, while good emotional intelligence can help students manage this stress more effectively, thus reducing its impact on cognitive load.

It is recommended to conduct further research on other variables that were not investigated but may contribute to cognitive load, such as resilience, stress management, individual behavior, and self-efficacy. Further research on the contribution of emotional intelligence and academic stress levels to students' cognitive load is also suggested. This is important for developing more comprehensive intervention strategies to improve students' academic performance.

Disclaimer (Artificial intelligence)

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Details of the AI usage are given below:

1.

2.

3.

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