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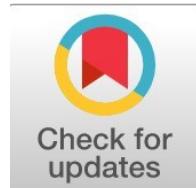

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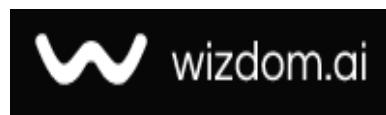How to submit to this journal (link)

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Reducing Academic Stress through Autonomy Fulfillment: A Self Determination Theory Solution in the Context of Students' Cognitive Load

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Abstract

General Background Academic stress has emerged as a critical issue in contemporary education, with increasing learning demands and structural pressures contributing to students' psychological strain. **Specific Background** Cognitive Load Theory explains that excessive academic demands, arising from material complexity, task accumulation, and inefficient instructional design, exceed students' working memory capacity and intensify stress, while educational policies and curriculum structures at the exosystem level further reinforce this burden. **Knowledge Gap** Existing studies predominantly examine academic stress through isolated internal or external factors, with limited integration of cognitive load, exosystem structures, and autonomy within a unified analytical framework. **Aims** This study aims to explain the role of cognitive load in the emergence of academic stress, analyze exosystem factors that exacerbate learning burden, and evaluate autonomy fulfillment within Self-Determination Theory as a strategy for reducing academic pressure. **Results** The findings indicate that excessive cognitive load significantly contributes to academic stress, while dense curricula, rigid schedules, and assessment policies intensify this condition; autonomy-supportive learning environments reduce extraneous cognitive load and strengthen students' self-regulation in managing academic demands. **Novelty** This study integrates Cognitive Load Theory, Bronfenbrenner's ecological perspective, and Self-Determination Theory to provide a comprehensive explanation of academic stress. **Implications** The findings highlight the necessity of flexible curriculum design, autonomy-supportive instructional practices, and policy reform to promote students' mental well-being and sustainable learning environments.

Highlights:

- Excessive learning demands and structural academic arrangements are closely associated with heightened psychological strain.

- Policy-level curriculum density and assessment practices contribute to sustained mental burden among learners.

- Learner choice and self-regulation function as protective mechanisms against accumulated academic pressure.

Keywords: Academic Stres, Autonomy, Self Determination, Cognitive Load.

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Introduction

The phenomenon of academic pressure on students is increasingly emerging as an important issue in educational research. Many students face intense learning demands, a large volume of material, and repeated evaluations that cumulatively result in academic stress.[1] This condition not only affects academic performance but also causes psychological impacts such as mental fatigue, anxiety, and a decline in well-being.[2] Therefore, understanding the sources and mechanisms of academic stress is an important first step in designing a learning environment that is more adaptive for students.[3]

One important aspect of triggering academic stress is a high cognitive load[4]. Cognitive Load Theory explains that human working memory capacity is limited, so when students receive too much information in a short period, they can easily experience cognitive overload.[5] In the school context, overload can stem from the number of subjects, the intensity of assignments, and the complexity of the material. When this burden exceeds the students' cognitive processing capacity, psychological stress becomes inevitable.[6] However, cognitive load does not appear suddenly; it is influenced by structural factors beyond the student's control. This is where Bronfenbrenner's Ecological perspective, particularly at the Exosystem level, becomes important. The Exosystem includes school policies, curriculum structures, administrative pressures, as well as educational decisions that indirectly affect students' learning experiences. [7] A dense curriculum, overlapping class schedules, or excessive assessment policies are examples of exosystem factors that increase cognitive load and trigger academic stress.

An ineffective learning environment further worsens the situation[8]. The effectiveness of learning depends not only on the teacher's teaching strategies but also on the alignment between academic demands, students' abilities, and the freedom given to them.[9] When the learning environment is rigid and highly standardized, students lose the opportunity to manage their own learning pace and style, leading to increased academic pressure.[10] In this context, Self-Determination Theory (SDT) provides an important theoretical foundation for understanding how basic psychological needs can influence students' resilience to academic pressure.[11]. One of the main needs in SDT is autonomy, which is the condition when an individual feels they have control over their actions and can make choices according to their preferences [12]. Autonomy in the context of learning can be realized through flexibility in assignments, opportunities to choose learning strategies, space to express interests, and student involvement in decision-making related to the learning process.[13]. When autonomy is fulfilled, students do not merely follow academic demands, but also engage voluntarily and meaningfully in learning activities. This makes them better able to manage stress, including stress stemming from high cognitive load.[14]

Previous research on academic stress has largely focused on students' internal factors, such as time management skills, test anxiety, or self-regulation.[15] Meanwhile, other research focuses on direct external factors, such as the number of assignments, pressuring teaching methods, or academic competition.[16] However, there are still few studies that examine academic stress from a more comprehensive perspective, namely by looking at how cognitive load, educational policy structures (exosystem), and the fulfillment of autonomy are interconnected. Most research on cognitive load does not include school policy aspects as a cause, and studies on autonomy are more focused on increasing learning engagement rather than as a strategy to reduce stress. This is the research gap, as there has been no study that integrates these three approaches to explain academic stress more comprehensively.

Based on this research gap, this article aims to achieve three objectives: first, to explain how cognitive load contributes to the emergence of academic stress. Second, to analyze how exosystem factors such as a dense curriculum, assessment policies, and school schedules exacerbate students' learning burden. And third, to evaluate how fulfilling autonomy can be an effective solution to reduce academic pressure in the context of a rigid learning environment. Through the integration of these three theoretical frameworks, this study is expected to provide a more comprehensive understanding of academic stress and offer new directions for improving instructional design and school policies.

Method

This research uses a qualitative method with a library research approach.[17] Data were obtained through a review of academic literature such as books, journal articles, research reports, and scientific documents relevant to the topics of cognitive load, academic stress, Bronfenbrenner's ecological theory, and Self-Determination Theory. Analysis was conducted using content analysis techniques, which included the process of collecting literature, data reduction, thematic categorization, concept interpretation, and argument synthesis to produce a comprehensive theoretical understanding.

Results and Discussion

A. Cognitive Load as a Trigger Factor for Academic Stress

Cognitive load refers to the amount of working memory resources required to process information at a given time. Within the framework of Cognitive Load Theory, working memory capacity is limited, so instructional design that does not take these limitations into account will lead to information processing failures.[18] When this capacity is exceeded, students' ability to understand, retain, and transfer information decreases; this condition is often directly associated with the experience of academic stress. Practically, cognitive load is not merely a technical variable; it becomes a bridge between academic demands, what needs to be learned, and the psychological condition of students, and how they respond to those demands.[19]

Cognitive load theory distinguishes three types of load: intrinsic, which relates to the complexity level of the material; extraneous, which arises from the way tasks are presented or designed; and germane, which is related to efforts to build schemas. All three play a role in the mechanism of academic stress. High intrinsic load requires students to have adequate time and support; without it, they can easily feel overwhelmed. High extraneous load adds unproductive burden, especially when instructions are unclear, tasks overlap, or learning media are ineffective. Germane load ideally supports learning, but in an unconducive environment, it can turn into a source of fatigue. Cognitive load occurs when the amount of information students need to understand exceeds their mental capacity to process it, making them easily tired, confused, and difficult to concentrate.[20] If this condition continues persistently, mental pressure increases and triggers academic stress.

The process leading to academic stress can be understood as a chain of cause and effect that begins with excessively high cognitive demands, followed by the accumulation of unfinished processing, then a decline in a sense of competence, which ultimately triggers emotional reactions such as anxiety and frustration and results in stress symptoms.[21] Failure to process information not only hinders learning but also lowers the perception of self-control, which is a strong predictor of the onset of anxiety. If overload occurs repeatedly, students enter a stress cycle that is difficult to break without changes in instructional design or psychosocial support. Although cognitive load is often understood as an environmental influence, there are individual factors that moderate its impact, such as working memory capacity, prior knowledge, metacognitive strategies, and mental health conditions. Students with strong prior knowledge can handle a greater intrinsic load, while strategies such as chunking, rehearsal, and time management can reduce the effects of extraneous load.[22] Therefore, the analysis of academic stress requires an approach that encompasses individual characteristics and task characteristics.

Metacognitive strategies such as planning, monitoring, and evaluation serve as a buffer against cognitive load. Students trained to break down large tasks into smaller parts, prioritize important information, and use elaboration techniques have better cognitive resilience. The absence of training in these strategies leaves students without tools to manage their learning load, making them more vulnerable to stress. Therefore, education that fosters metacognition acts as a preventive measure against increased stress due to overload.[23] Cognitive load is dynamic and changes according to the accumulation of tasks and the availability of recovery time. A dense learning schedule without cognitive breaks hinders memory consolidation and increases the risk of mental fatigue. This temporal analysis is important because academic stress is often the cumulative result of repeated exposure to load that is not balanced with recovery mechanisms. When cognitive load exceeds adaptive capacity, the resulting symptoms are not only subjective, such as feelings of being overwhelmed and anxiety, but also objective, such as sleep disturbances, decreased attention, lower academic performance, and inconsistent academic results.[24] The research findings indicate a relationship between academic performance and reports of overload, suggesting that cognitive load can be used as an indicator for early intervention.

Instructional design, teacher role quality, and task structure are environmental factors that determine the magnitude of external load. Delivering material without gradual support or using unstructured learning materials adds unnecessary burden.[25] Therefore, pedagogical improvements such as simplifying instructions, using various types of material representations, and organizing information have the potential to reduce extraneous load and decrease academic stress. From a policy perspective, managing study loads and curriculum design need to consider students' working memory capacity as well as the need for recovery time. This leads to the necessity of adjusting curriculum loads, regulating the intensity of assessments, and training teachers to design cognitively efficient tasks. Such policies position cognitive load as a structural factor that plays a significant role in the formation of academic stress and as a strategic point for intervention.

B. Exosystem Factors as Structural Determinants of Learning Load

In Bronfenbrenner's ecological framework, the exosystem is a layer of the environment that does not involve direct interaction with the individual but influences their life through the structuring of conditions such as school policies, curriculum regulations, scheduling arrangements, and administrative demands. In education, the exosystem functions as a determinant of the structure that shapes the basic rules for the implementation of learning. Its impact flows into the design of learning activities, the amount and intensity of assignments, as well as the priorities of evaluation, which are ultimately felt by students as an academic burden.[26]

A dense curriculum results in a quantitative impact in the form of an increased amount of material and assignments, as well as a qualitative impact in the form of an emphasis on achieving competencies in a short period of time. [27]. This condition increases the intrinsic load due to extensive and complex material, while also magnifying the extraneous load when the organization of the material does not align with the students' cognitive structure. Thus, the curriculum can be understood as an initial determining factor that shapes the structure of academic load at the system level [28]. Assessment policies oriented toward numbers, rankings, and frequent evaluations create a competitive atmosphere where time is constantly pressured.[29] This situation pushes schools and teachers to prioritize curriculum coverage over depth of understanding. As a result, the external burden on students increases because the learning process becomes focused on meeting formal requirements rather than on understanding the material. Assessment policies thus act as a determinant of instructional direction that often sacrifices the cognitive well-being of students.[30]

A busy school schedule also has a significant impact. Placing heavy subjects consecutively without breaks reduces opportunities for memory consolidation and forces students to switch focus rapidly. Repeated shifts in focus demand additional cognitive costs, increasing the overall mental load. This indicates that schedule design is an exosystem variable that can enhance mental fatigue and the risk of academic stress.[31] Pressure from broader structures such as national exams, accreditation targets, and parental expectations reinforces the influence of the exosystem. Schools internalize these demands through additional exercises, remedial assignments, and various forms of reporting, all of which increase the burden on students. Thus, macro-level pressure not only shapes policy but also manifests as a practical burden directly

experienced by learners.[32]

Teachers as implementers of learning operate within a framework shaped by the exosystem. Many of their pedagogical decisions are determined by administrative obligations and curriculum targets.[33] Teachers who are bound by structural demands tend to focus on completing the material and reduce time for differentiation, in-depth discussion, or providing gradual support. As a result, students are exposed to a higher external burden due to limited space for more supportive learning. Students themselves have little control over the curriculum, policies, or schedule. [34] The low level of control experience is a strong factor that triggers stress, because individuals who feel they cannot influence environmental demands are more vulnerable to despair and increased stress reactivity. Thus, the exosystem not only functions as a structural factor but also as a significant psychological determinant.[35] Education policy reform ultimately faces the need to balance academic standards with student well-being. Cognitive load theory indicates that the accumulation of demands without pedagogical adjustments reduces learning effectiveness and negatively impacts students' psychological health.[36]. Policy success can only be achieved when the balance between academic rigor and students' adaptive capacity is a primary consideration in the design of the education system.[37]

C. Fulfilling Autonomy as an Effective Strategy for Reducing Academic Stress

Autonomy dalam Self Determination Theory menggambarkan pengalaman ketika seseorang merasa bahwa tindakannya merupakan pilihan internal [38]. In the context of education, autonomy appears when students are given the space to make decisions regarding their learning process, such as choosing the topic, the way to present their learning outcomes, or the pace of completing assignments.[39]. Autonomy remains within guided limits because this freedom operates alongside the support of a structure that ensures learning objectives are achieved without leading to disorder. The fulfillment of autonomy affects how students perceive academic pressure. When demands are seen as something chosen rather than imposed, stress reactions tend to decrease. [40]. The feeling of having control over the learning process makes demands feel more manageable, reducing emotional and physiological responses to stress. Thus, autonomy becomes a protective factor that helps lower stress reactivity to cognitive load.[41]

Providing choices to students also impacts the cognitive process. When students decide on strategies or media that align with the way they process information, unnecessary cognitive load can be reduced.[42] Task format options allow students to work with approaches they are already familiar with, so cognitive energy is not wasted on adapting to instructions that are less suitable.[43] Autonomy also strengthens self-regulation and metacognitive abilities. Students who plan and assess their own progress practice recognizing their learning processes. This habit makes them more skilled at managing time, setting priorities, and choosing learning strategies that reduce the risk of overload. In this way, autonomy functions as a pedagogical tool that builds long-term learning capacity.[44]

At the classroom level, autonomy can be applied through choices in types of tasks, learning resources, completion pace, or opportunities to create assessment rubrics together with the teacher. This freedom must be accompanied by clear guidance so that students are still able to make appropriate decisions. Without minimal support, choices can become an additional burden for students who are not yet ready.[45] Furthermore, at the curriculum level, autonomy can appear in the form of modular curricula, different learning pathways, or specialization tailored to students' interests and abilities[46]. Policies that provide the freedom to choose learning paths help reduce the uniform pressure that often causes stress, as not all students can meet the same demands.

Various studies indicate that a learning environment that supports autonomy is associated with lower stress levels, better well-being, and higher academic engagement. Consistent findings are also observed in mental health aspects, such as reduced task-related anxiety. This evidence reinforces the role of autonomy as an effective approach in reducing academic stress. The effectiveness of autonomy depends on student readiness, teacher support, and a sense of security in the learning environment. [47]. Students who do not yet have good study strategies need guidance before being given broader choices. The ideal implementation starts with guided choices that are gradually expanded as self-regulation capacity increases.[48].

Autonomy also carries potential risks. Too many choices can cause confusion and increase cognitive load. Moreover, options that can only be utilized by students with better access to resources have the potential to widen inequalities. Therefore, the design of autonomy needs to be accompanied by assurances of access and appropriate support so that all students can benefit equally.[49] Overall, autonomy plays an important role as part of a comprehensive strategy to reduce academic stress. At the classroom level, it operates through learning practices, while at the policy level, it is present in the form of more flexible curriculum design. When autonomy is combined with more efficient task design, reinforcement of metacognitive skills, and improvement of assessment systems, it functions as a strategic element in creating a learning environment that balances academic demands with student well-being.

Conclusion

Excessive cognitive load has been proven to be one of the main determinants of academic stress in students. This load not only stems from the complexity of the material but is also influenced by structural factors at the exosystem level, such as a dense curriculum, rigid academic schedules, and education policies that promote high task intensity. When the learning environment is unable to adapt to students' cognitive capacities, academic pressure increases and negatively affects their well-being and learning performance. Fulfillment of autonomy from the perspective of Self-Determination Theory offers a relevant solution to reduce this academic stress. A learning environment that supports choice, flexibility, and self-control has been shown to reduce extraneous load and enhance students' ability to manage cognitive demands. Thus, improving

educational policies and designing curricula that provide more autonomy for students becomes a strategic step in creating a healthy, adaptive, and humanistic learning environment.

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