

The Mediating Role of ChatGPT in The Relationship Between Academic Workload, Learning Facilities, and Academic Efficiency

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Abstract:

In the evolving academic landscape, artificial intelligence (AI) tools like ChatGPT have gained prominence for their potential to enhance academic efficiency. This study examines the mediating role of ChatGPT in the relationship between academic workload, learning facilities, and academic efficiency among higher education students. Using a quantitative cross-sectional design and structural equation modeling, the findings highlight that while academic workload and learning facilities significantly impact academic efficiency, ChatGPT serves as a critical mediator. The results reveal that ChatGPT alleviates the negative effects of high workloads by automating routine tasks and providing personalized support, thereby enhancing productivity and reducing stress. Additionally, the study identifies that while learning facilities strongly influence academic efficiency, their direct effect on ChatGPT usage is limited. These insights underline the transformative role of AI in education, offering strategies for institutions to integrate AI tools to address challenges in resource-constrained environments. The findings contribute to the growing literature on AI in education, emphasizing the need for balanced adoption of technological innovations to optimize student outcomes. Future research should explore longitudinal impacts of AI tools across diverse educational settings.

Keywords — Academic workload, learning facilities, ChatGPT, academic efficiency.

I. INTRODUCTION

In the contemporary academic landscape, technological advancements have significantly transformed educational practices and performance metrics. Among these advancements, artificial intelligence (AI) tools, particularly ChatGPT, have emerged as pivotal assets for students, educators, and institutions. ChatGPT's capabilities including instant information retrieval, personalized learning support, and task automation position it as a potential mediator in addressing critical challenges such as academic workload and the adequacy of learning facilities, both of which play a crucial role in influencing academic efficiency [1].

This study specifically focus on students in higher education institutions often faced with substantial academic pressures due to increased workloads and limited access to quality learning facilities. Academic workload can be defined as the amount and complexity of academic responsibilities that can be an important determinant of academic performance and student well-being. Excessive workloads can lead to heightened stress, diminished productivity, and academic burnout, underscoring the necessity for innovative solutions [2]. Additionally, the availability and quality of learning facilities including libraries, technological infrastructure, and study environments are essential for fostering academic success. Inadequate or poorly maintained facilities can hinder students'

engagement with their academic responsibilities, exacerbating challenges to academic efficiency [3].

However the well-established relationships between these factors, notable gaps exist in the literature. While prior studies have examined the individual effects of workload and facilities on academic outcomes, they often neglect the interactive or mediated effects involving technological interventions. Furthermore, empirical evidence on the role of AI tools like ChatGPT in educational settings remains limited, particularly regarding their potential to mitigate the adverse impacts of high academic workloads or insufficient learning facilities [4][5]. Addressing these gaps is critical for exploring ChatGPT's potential to enhance academic efficiency through its unique features, such as automating routine tasks and providing tailored support for complex academic challenges [6].

This research aims to explore the relationships between academic workload, learning facilities, and academic efficiency, with a specific emphasis on the mediating role of ChatGPT. The study is guided by three primary objectives: (1) To examine how academic workload and learning facilities impact academic efficiency, (2) To investigate the mediating role of ChatGPT in the relationship between academic workload and academic efficiency, and (3) To evaluate the mediating role of ChatGPT in the relationship between learning facilities and academic efficiency. This research aims to deepen the understanding of AI integration in education, focusing on ChatGPT's role in mediating the relationship between academic workload, learning facilities, and academic efficiency. It offers theoretical insights by contributing to the literature on AI in education through a mediating framework involving ChatGPT. For policymakers, the findings provide guidance on optimizing academic workloads and improving learning environments with AI tools. Practically, it offers actionable strategies for educators and institutions to leverage AI to enhance student outcomes and institutional effectiveness [2].

II. LITERATURE AND HYPOTHESIS

In the modern educational landscape, understanding the dynamics between academic workload, learning facilities, and academic efficiency is critical for enhancing student performance. This chapter explores the theoretical foundation underpinning these relationships, supported by previous research and relevant hypotheses. Specifically, it integrates academic workload, learning facilities, and academic efficiency into a cohesive framework, highlighting the mediating role of ChatGPT as an innovative AI tool in education.

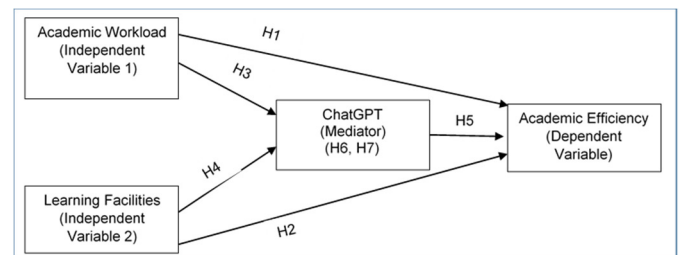


Figure 1: Theoretical Model

A. Academic workload and effects on academic efficiency

The relationship between academic workload and academic efficiency among higher education students involves both positive and negative dynamics. A well-structured workload can foster academic efficiency by encouraging students to develop strong time management, problem-solving, and prioritization skills. Studies such as [1] indicate that when workloads are balanced, students are more engaged, motivated, and capable of achieving better academic outcomes. Moreover, found that balanced workloads enhance mental well-being, enabling students to focus on tasks more effectively. Moderate levels of academic pressure, as noted by [7], can serve as a motivational force, pushing students to overcome challenges and improve their performance during critical assessments.

However, excessive academic workload can undermine students' academic efficiency by inducing stress, fatigue, and burnout. [8] highlighted that elevated workloads during demanding periods, such as exams, often lead to heightened anxiety and cognitive impairments, negatively affecting performance. Similarly, [9]

observed that persistent stress from heavy workloads reduces students' life satisfaction and academic success. Prolonged exposure to unmanageable academic demands can diminish students' ability to effectively manage their responsibilities, ultimately hindering their educational outcomes. Consequently, we suggest:

Hypothesis 1 (H1): Academic workload has significant positive impact on academic efficiency

B. Learning Facilities And Effects On Academic Efficiency

The quality and availability of learning facilities are essential in enhancing academic efficiency among students. Research indicates that well-equipped environments, including libraries, laboratories, and technology resources, significantly influence student engagement, motivation, and overall academic performance. For instance, [10] found that students in institutions with adequate facilities tend to perform better academically than those in less equipped settings. This assertion is further supported by [11] who emphasizes the importance of a creative learning environment in fostering engagement and academic performance, particularly in fields like nursing education where practical application is crucial. Additionally, [12] highlight that a positive perception of the learning environment correlates with improved learning outcomes, suggesting that students thrive in settings tailored to their educational needs. These findings underscore the necessity of investing in quality learning facilities to promote academic success.

Conversely, inadequate learning facilities can severely hinder academic efficiency and negatively impact student performance. Research has shown that insufficient resources, such as access to technology and study spaces, contribute to increased academic stress and lower engagement levels. For example, [13] reported that students in Pakistan faced significant challenges during the COVID-19 pandemic due to a lack of access to online learning tools, adversely affecting their academic performance. Similarly, [10] indicated that higher perceived workloads in environments lacking adequate support directly correlated with poorer performance among occupational therapy students. Furthermore, [8] found that students experiencing barriers such as overcrowded

classrooms and insufficient technological support reported higher stress levels and lower academic achievement. Consequently, we suggest:

Hypothesis 2(H2): Learning facilities has significant positive impact on academic efficiency.

C. Academic Workload and ChatGPT Usage.

The interplay between academic workload and the utilization of AI technologies like ChatGPT among higher education students presents a complex landscape characterized by both positive and negative dimensions [14]. On the one hand, academic pressures often compel students to seek out innovative solutions to manage their studies more effectively. Research indicates that students facing heavy workloads frequently turn to tools such as ChatGPT to alleviate stress and enhance their learning experiences. For instance, [7] highlights that anxiety related to academic performance can motivate students to adopt coping strategies, including the use of technology to improve their outcomes [15]. Similarly, [16] emphasize that students' perceived workload significantly influences their academic performance, suggesting that the integration of AI tools can facilitate personalized learning experiences that allow students to engage with content at their own pace. In this context, ChatGPT serves as a valuable resource, providing immediate access to information and support, which can lead to improved academic performance and reduced stress.

Conversely, excessive academic workload can have detrimental effects that hinder effective engagement with technologies like ChatGPT. Research by [17] indicates that high levels of workload are associated with increase stress and focus among students, which can diminish their capacity to utilize educational technologies effectively. The psychological strain resulting from overwhelming academic demands may deter students from leveraging tools like ChatGPT, as they may feel too stressed or fatigued to engage with these resources meaningfully. Furthermore, while manageable workloads can motivate students to enhance their efficiency, excessive time pressure often leads to negative well-being outcomes, including fatigue and anxiety. Consequently, we suggest:

Hypothesis 3(H3): Academic workload has significant positive impact on ChatGPT

D. Learning Facilities and ChatGPT Usage

The relationship between learning facilities and ChatGPT usage among higher education students is influenced by the quality and accessibility of resources such as libraries, technological infrastructure, and study environments. Well-equipped learning environments, including reliable internet access, modern technological tools, and collaborative spaces, significantly enhance students' ability to effectively use AI tools like ChatGPT. Research suggests that the ease of access to these facilities contributes to students' perceptions of the usefulness and ease of use of AI technologies, making them more likely to adopt such tools in their learning process. For example, a supportive technological infrastructure allows students to quickly access information and receive personalized support through ChatGPT, improving academic performance and reducing stress [18]. Libraries and study spaces that promote independent learning and provide adequate resources further enable students to engage with AI tools, making the learning experience more efficient and dynamic [19].

However, concerns about over-reliance on advanced learning facilities and AI technologies also emerge in the literature. Some studies indicate that heavy dependence on tools like ChatGPT may reduce students' critical thinking and problem-solving abilities, as they may choose immediate answers over engaging in deeper analysis [20]. Additionally, inadequate training on using these technologies or overly complex infrastructures can lead to frustration, limiting the effectiveness of these tools in the learning process [21]. Therefore, while learning facilities are essential for fostering ChatGPT usage, they must be designed in a way that promotes balanced, critical engagement with technology to avoid diminishing students' cognitive skills.

Hypothesis 4 (H4): Learning facilities has significant positive impact on ChatGPT Usage.

E. ChatGPT Usage And Effects On Academic Efficiency

The integration of ChatGPT into educational settings has sparked significant debate regarding its

impact on academic efficiency, presenting both positive and opposing arguments. On the positive side, numerous studies indicate that ChatGPT enhances learning outcomes by providing immediate feedback and personalized support, which can lead to improved student performance. For example, Sun's research demonstrates that students using ChatGPT showed better performance in terms of functionality, user flow, and comprehension compared to those relying solely on traditional search engines [22]. Similarly, Shaikh's emphasizes ChatGPT's role in supporting language learning by offering constructive feedback, thus facilitating skill development [23]. These findings align with Huesca's study, which suggests that combining ChatGPT with flipped learning strategies significantly boosts student performance [24].

On the other hand, there are considerable concerns regarding the limitations and ethical implications of using ChatGPT in education. Chen argues that if ChatGPT does not align with students' learning values, its effectiveness may diminish, leading to reluctance in adopting it [25]. Furthermore, Watters raises doubts about the reliability of AI-generated content, warning that excessive reliance on such tools could undermine critical thinking skills (Watters, 2023). These concerns highlight the need for careful consideration of both the benefits and potential drawbacks of integrating ChatGPT into educational contexts.

Hypothesis 5 (H5): ChatGPT Usage has significant positive impact on academic efficiency.

F. The Mediating Role of ChatGPT in Academic Efficiency

ChatGPT plays a pivotal mediating role in enhancing academic efficiency by acting as a supportive intermediary between academic workload and students' learning outcomes. As an AI tool, ChatGPT provides students with real-time assistance, enabling them to manage their academic tasks more effectively. It offers personalized feedback, helps in clarifying complex topics, and assists in generating ideas, thereby alleviating the pressure of heavy academic workloads. Research shows that AI tools like ChatGPT can offer personalized learning experiences, adapting to

individual students' needs and preferences, which improves engagement and academic performance [26]. By facilitating immediate access to information and resources, ChatGPT helps students optimize their time, enabling them to focus more on critical analysis and problem-solving, which are essential for improving academic performance [27]. This mediation can lead to enhanced academic efficiency by streamlining learning processes, making it easier for students to absorb and engage with course material.

However, ChatGPT's function as a mediator can also pose challenges. While it provides immediate support, excessive dependence on AI tools can reduce students' engagement with the cognitive processes necessary for deeper learning. Overuse of ChatGPT may lead to procrastination, hinder critical thinking, and undermine memory retention as students might rely too heavily on AI for completing assignments. Studies have indicated that excessive use of generative AI tools may correlate with diminished academic outcomes, particularly for students with high learning potential [28]. Furthermore, concerns over the authenticity of AI-generated content and its potential impact on academic integrity highlight the importance of using ChatGPT as a complementary tool rather than a replacement for independent academic efforts [29]. As a result, we propose alternative hypotheses: Hypothesis 6 (H6): ChatGPT mediates the relationship between academic workload and academic efficiency
Hypothesis 7 (H7): ChatGPT mediates the relationship between learning facilities and academic efficiency

III. METHODOLOGY

This study examines the relationships between academic workload, learning facilities, and academic efficiency, with ChatGPT as a mediating variable. The theoretical framework suggests that academic workload and learning facilities directly and indirectly influence academic efficiency through the use of ChatGPT [30]. By investigating these dynamics, the study aims to provide insights into the role of AI tools in enhancing academic outcomes, particularly in higher education, [24].

Understanding how ChatGPT can facilitate learning and improve academic performance is essential for educators and institutions seeking to integrate AI technologies effectively into their teaching methodologies (Sila, 2023).

A. Research Design

This research employs a quantitative, cross-sectional design to test the proposed hypotheses regarding the relationships among academic workload, learning facilities, and academic efficiency, with ChatGPT functioning as a mediator. The study's framework is grounded in a comprehensive review of existing literature, and the hypotheses are evaluated using advanced statistical modeling techniques, including Structural Equation Modeling (SEM) [32]. This methodological approach allows for an objective examination of the relationships between variables at a specific point in time, facilitating a robust analysis of the impact of ChatGPT on academic outcomes [33].

B. Population and sample

The target population comprises students across various department and programme in Polytechnic Sultan Idris Shah. A random sampling method was employed to ensure representation from different academic disciplines. The sample size was determined based on G*power 3.1, to ensuring sufficient statistical power for hypothesis testing.

C. Data Collection

Primary data were collected using a structured survey instrument. The survey was divided into sections covering demographic information, academic workload, learning facilities, ChatGPT usage, and academic efficiency. All items were adapted from the questionnaire used by [1] in previous research and were measured using a Likert scale. Ethical approval was obtained, and participants provided informed consent before completing the survey [34]. This process ensured that the research adhered to ethical standards and that participants were fully informed about their rights and the study's purpose [35].

D. Data Analysis

Data analysis was performed in 2 steps. First, assessment Measurement Model to ensures reliability and validity of the constructs. Factor loadings are evaluated to confirm they meet the minimum threshold for indicator reliability. Reliability is assessed through metrics such as Cronbach’s Alpha, Composite Reliability and Average variance extracted (AVE), ensuring internal consistency. Construct validity is examined via Discriminant Validity, often with the Fornell-Larcker Criterion, to confirm clear distinctions between constructs [36].

The Structural Model Assessment examines relationships between variables. Multicollinearity is checked through Path Coefficients Evaluation , Coefficient of Determination (R²) Assessment and Hypothesis testing evaluates the significance of relationships, and mediation effects are analyzed using bootstrapping techniques.

4.0 RESULT AND DISCUSSION

A. Measurement Model Assessment: Construct Reliability and Validity

The assessment of the measurement model using Partial Least Squares Structural Equation Modeling (PLS-SEM) to confirmed the reliability and validity of the constructs involved in the study. The constructs of Academic Efficiency, Academic Workload, and ChatGPT exhibited strong internal consistency, as indicated by Cronbach's alpha values ranging from 0.819 to 0.929, and composite reliability (rho_a and rho_c) exceeding the threshold of 0.7 [37]. Convergent validity was largely established, with Average Variance Extracted (AVE) values surpassing the recommended minimum of 0.5, such as 0.58 for Academic Efficiency and 0.703 for ChatGPT (Appiah-Twumasi et al., 2022; Jiang et al., 2022). However, the Learning Facilities construct presented an AVE of 0.491, which is slightly below the acceptable threshold, raising concerns regarding its convergent validity [38][39]. To enhance the measurement model, items LF2 and AW7 were removed due to their low factor loadings (<0.500), aligning with best practices for

model refinement [40]. Following these adjustments, the overall reliability and validity of the measurement model were significantly improved. The removal of low-loading items led to enhanced construct metrics, resulting in robust composite reliability for Learning Facilities (rho_c = 0.844) and Academic Workload (rho_c = 0.88) [41]. The remaining items effectively explained the constructs while maintaining strong indicator reliability [42].

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Academic Efficiency	0.819	0.823	0.873	0.58
Academic Workload	0.835	0.861	0.88	0.523
Chatgpt	0.929	0.933	0.943	0.703
Learning Facilities	0.789	0.879	0.844	0.491

Table 1: Construct Reliability And Validity

B. Structural Model Evaluation (Inner Mode)

The structural model evaluation is a fundamental step in quantitative research, focusing on analyzing the relationships between latent variables to understand their interactions within the proposed framework. This process examines the strength and direction of hypothesized relationships, the model's explanatory power (R²), and the statistical significance of each path. By systematically assessing these components, the evaluation ensures the validity of the structural model and establishes its predictive capabilities, providing a solid basis for interpreting the findings and drawing meaningful conclusions.

D. Path Coefficients Evaluation

The structural model analysis demonstrates key relationships among the variables. Academic workload positively impacts ChatGPT usage ($\beta = 0.323$) and academic efficiency ($\beta = 0.217$), indicating its dual influence. ChatGPT significantly enhances academic efficiency ($\beta = 0.335$), highlighting its pivotal role. Learning facilities exhibit the strongest direct effect on academic

efficiency ($\beta = 0.388$), while their influence on ChatGPT is weaker ($\beta = 0.110$). These findings underscore the importance of learning facilities and ChatGPT in improving academic performance.

variance a predictor explains, providing insights into its importance. Commonly interpreted as small (0.02), medium (0.15), or large (0.35) effects.

Path	Path Coefficients
Academic_Workload -> Academic_Efficiency	0.217
Academic_Workload -> Chatgpt	0.323
Chatgpt -> Academic_Efficiency	0.335
Learning_Facilities -> Academic_Efficiency	0.388
Learning_Facilities -> Chatgpt	0.11

Table 2: Path coefficients

2). Coefficient of Determination (R²) Assessment

The Coefficient of Determination (R²) is a key statistical measure in regression analysis, used to evaluate the extent to which the independent variables explain the variance in the dependent variable. R² values range from 0 to 1, where higher values indicate a stronger model fit and greater predictive accuracy. This measure is essential for determining the effectiveness of the model in capturing relationships between variables.

In this analysis, the R² and Adjusted R² values for academic efficiency are 0.388 and 0.375, respectively, indicating that approximately 38.8% of the variance in academic efficiency is explained by the independent variables, with a slightly lower explanatory power after adjusting for the number of predictors. For ChatGPT, the R² value is 0.117, suggesting that only 11.7% of the variance is explained by the independent variables, with the Adjusted R² at 0.105, reflecting a marginally lower explanatory power. These results highlight the varying degrees of influence that the predictors have on each dependent variable.

	R-square	R-square adjusted
Academic_Efficiency	0.388	0.375
ChatGPT	0.117	0.105

Table 3: Coefficient of Determination

3). Effect Size F square (f²) Evaluation

Effect size (f²) evaluation measures the strength of a predictor variable's impact on a dependent variable in models like regression or structural equation modeling. It helps quantify how much

Relationship	f ² Value	Effect Size Interpretation
Academic_Workload → Academic_Efficiency	0.069	Small to Medium
Academic_Workload → Chatgpt	0.118	Medium
Chatgpt → Academic_Efficiency	0.162	Medium
Learning_Facilities → Academic_Efficiency	0.242	Medium to Large
Learning_Facilities → Chatgpt	0.014	Negligible

Table 4: Effect Size

The findings reveal that learning facilities significantly impact academic efficiency (f² = 0.242, medium to large effect size). The use of ChatGPT also mediator influences academic efficiency (f² = 0.162), highlighting the growing relevance of AI tools in education. Additionally, academic workload has a small to medium impact on academic efficiency (f² = 0.069) and a moderate effect on ChatGPT usage (f² = 0.118). However, learning facilities have a negligible effect on ChatGPT usage (f² = 0.014), indicating minimal interplay between infrastructure and AI adoption.

C. Hypothesis Testing (Direct and Indirect Effect)

Hypothesis testing in this model is conducted in three stages. First, it examines the direct effect of the independent variables on the dependent variable. Second, it evaluates the direct effect of the independent variables on the mediator variable. Lastly, it assesses the indirect effect of the mediator on the relationship between the independent and dependent variables.

1). Direct Effect of Independent Variables on Dependent Variables

Hypothesis	Path	Coef	T-Value	P-Value	Find ing
H1	Academic_Workload >Academic_Efficiency	0.217	3.00	0.001	Supported
H2	Learning_Facilities> Academic_Efficiency	0.388	5.306	0.000	Supported

Table 5: Result Direct Effect of Independent Variables on Dependent Variables

The research findings reveal significant positive relationships between academic workload, learning facilities, and academic efficiency. Hypothesis H1

demonstrates that academic workload has a moderate yet statistically significant positive effect on academic efficiency ($\beta = 0.217$, $T = 3.00$, $p = 0.001$). This suggests that a well-structured academic workload enhances students' ability to perform efficiently. Meanwhile, Hypothesis H2 indicates a stronger positive influence of learning facilities on academic efficiency ($\beta = 0.388$, $T = 5.306$, $p < 0.001$). The higher coefficient and t-value for H2 underscore the critical role of well-equipped learning environments in fostering academic success.

2). Direct Impact of Independent Variables on Mediator Variables

Hypothesis		Coef	T-Value	P-Value	Finding
H3	Academic_Workload -> ChatGPT	0.323	4.074	0.000	Supported
H4	Learning_Facilities -> ChatGPT	0.111	1.132	0.095	Not Supported

Table 6: Result Direct Impact of Independent Variables on Mediator Variables

The findings reveal that academic workload significantly influences ChatGPT usage, with a standardized coefficient (β) of 0.323, a t-value of 4.074, and a p-value of less than 0.001, indicating that increased academic demands drive students to seek AI support (Abdaljaleel, 2023; Ali, 2023). Conversely, learning facilities do not significantly impact ChatGPT usage, as evidenced by a β of 0.111, a t-value of 1.132, and a p-value of 0.095.

3). Direct Impact of Mediator Variables on independent Variables

Hypothesis		Coef	T-Statistic	P-Value	Finding
H5	ChatGPT-> Academic_Efficiency	0.335	4.343	0.000	Supported

Table 7: Result Direct Impact of Mediator Variables on independent Variables

The results demonstrate a direct and significant impact of ChatGPT on academic efficiency. Hypothesis H5 confirms that the use of ChatGPT positively influences academic efficiency ($\beta = 0.335$, $T = 4.343$, $p < 0.001$), indicating a strong and statistically significant relationship.

5) Mediating Testing

The mediation analysis is conducted by Academic Workload and Learning Facilities as independent variables, Academic Efficiency as dependent variable, and ChatGPT as mediator. The mediation analysis is based on the analysis of indirect effects based on the guideline by [43] classical approach. We performed mediation analysis by using the indirect effects based on bootstrap procedures (500 samples) and bias-corrected bootstrap confidence interval (90%). The results are provided in the following table.

Path	Sample mean (M)	STDEV	T statistics	P values	Remark
Academic_Workload -> Academic_Efficiency	0.11	0.04	2.676	0.004	Support
Learning_Facilities -> Academic_Efficiency	0.04	0.03	1.208	0.113	Not Supported

Table 8: Result Mediating Testing

The findings indicate that the relationship between academic workload and academic efficiency is statistically significant, with a path coefficient of 0.11, a T statistic of 2.676, and a p-value of 0.004, supporting the hypothesis. In contrast, the relationship between learning facilities and academic efficiency shows no statistical significance, with a path coefficient of 0.04, a T statistic of 1.208, and a p-value of 0.113, which does not support the hypothesis.

IV. CONCLUSIONS

The findings of this study provide valuable insights into the mediating role of ChatGPT in enhancing academic efficiency amidst challenges related to academic workload and learning facilities. The results suggest that a well-structured academic workload can foster improved academic outcomes by encouraging students to develop essential skills such as time management and problem-solving. Research by [44] supports this notion, indicating that effective time management is crucial for academic success. ChatGPT further enhances this relationship by alleviating stress and providing

tailored support for complex academic tasks, which aligns with the findings of [45], who emphasize the importance of personalized learning experiences in reducing academic anxiety. This highlights ChatGPT's potential as an essential tool for addressing the challenges posed by demanding academic environments, consistent with research that emphasizes the adaptability of AI tools in education [46].

The study also reveals the significant influence of learning facilities on academic efficiency, underscoring the importance of resource availability and infrastructure quality in promoting academic success. According to [44]:, the quality of learning environments directly impacts student engagement and retention. However, the role of ChatGPT as a mediator between learning facilities and academic efficiency appears limited, indicating that its adoption and impact may be less dependent on the quality of physical resources. This finding suggests that while traditional infrastructure remains vital, the integration of AI tools like ChatGPT offers opportunities to bridge gaps in resource-constrained settings, making educational support more accessible to diverse student populations [5]. This is particularly relevant in light of the ongoing challenges faced by educational institutions in providing adequate resources, as highlighted by the [47]World Bank (2020).

Overall, these findings contribute to the growing body of literature advocating for the integration of AI in education. ChatGPT's ability to mediate the challenges posed by academic workload highlights its transformative potential, particularly in enhancing student outcomes through personalized learning experiences. As institutions increasingly adopt technology in education, understanding the nuanced roles of AI tools is critical for optimizing their implementation. Future research should explore the broader implications of AI integration, focusing on its long-term effects and adaptability across diverse educational contexts [6]. This aligns with the call for more empirical studies to investigate the effectiveness of AI in educational settings, particularly in mitigating the challenges of high academic workloads and inadequate learning facilities[48].

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