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Influence of Time Management Skills and Technostress on Academic Performance Among the Private University Students: A Conceptual Framework

Jogtika Ramasamy[1,*], Nasreen Khan Thandar Oo[1]

[1]Faculty of Management, Multimedia University, Selangor, Malaysia
*Corresponding author: jogtika.ap.ramasamy@student.mmu.edu.my
(ORCiD: 0009-0004-3013-1092)

Abstract

Digital tools enhance learning but can also cause technostress, which can impact focus and academic performance. Balancing technology use with effective time management and social engagement is key to student success. Students in Malaysia's Klang Valley reported increased feelings of loneliness, mental health issues, and technostress, particularly as a result of the shift to online learning. This study aims to propose a conceptual framework based on the Study Demand-Resources Theory, examining how time management skills and technostress dimensions influence academic performance through the mediating role of student engagement. A quantitative and cross-sectional survey will be conducted by distributing Likert scale surveys to private university students in the Klang Valley. The data will be analysed using Partial Least Squares Structural Equation Modeling, as it is suitable for handling complex models. A total of 300 respondents were targeted for this study, as this sample size is sufficient for structural equation modelling and ensures reliable and generalisable results. The questionnaire will be distributed online via email, WhatsApp, and academic and social media platforms to ensure a broad and efficient reach. The expected outcome is to provide insights into how students balance technostress and time management to improve academic performance, with student engagement as a key mediator.

1.0   Introduction

Academic performance is a key indicator of student success and institutional effectiveness, reflecting students' achievements through exam grades and coursework marks (Alzabidi et al., 2024). It not only demonstrates critical thinking and problem-solving abilities but also influences future opportunities, such as scholarships and job opportunities. In Malaysia, the rapid growth of the education sector, particularly in private universities, significantly contributes to the country's ambition of becoming a regional education hub (Abdullah et al., 2022; Hamid, 2022; Ministry of Education, 2013). These institutions are renowned for offering diverse, tech-driven learning experiences (Cheng & Chiang, 2019). Time management skills are essential for students, enabling them to balance academic and personal commitments, reduce stress, and enhance productivity. However, the rise of technostress, driven by the increasing reliance on technology in education since the COVID-19 pandemic, has a negative impact on students' performance and engagement (Kulikowski et al., 2022). Student engagement characterised by active participation and interest in learning. Various factors, such as teaching methods and the classroom environment, influence it. Student academic performance is influenced by internal challenges, such as poor time management, lack of motivation, and self-control, as well as external factors like study overload, distractions, and the demands of technology (Calonia et al., 2023). Poor time management leads to irregular class attendance, poor sleep quality, and difficulty balancing study tasks and rest time (Upadhyaya & Vrinda, 2020). Academic procrastination is influenced by the fear of failure (Tan & Prihadi, 2022).

Most students first encountered the term technostress during the sudden transition to online learning between 2020 and 2021 (Kulikowski et al., 2022). University life has become more stressful, leading to increased anxiety and mental health issues for students (Shahzad et al., 2024). According to researchers, most university students in the Klang Valley face difficulties with online learning, including technical issues, limited interaction with lecturers and peers, and feelings of isolation during virtual classes (Hussain et al., 2023). Although online learning offers flexibility, it introduces challenges such as mental health issues, technostress, and social isolation (Ali et al., 2024). Recent studies indicate it continues to cause technostress, mental fatigue, and feelings of

isolation, especially in hybrid and tech-driven environments (Bevens et al., 2024; Rajamanikam, 2023). In Malaysia, while many working postgraduates value the convenience of ODL, prolonged screen time and limited interaction still contribute to psychological strain (Amin et al., 2025).

Moreover, many students in Klang Valley also experience anxiety, stress, and depression, with a notable increase in these conditions compared to the previous studies during the pandemic (Galvin et al., 2022; Wong et al., 2023). Technostress manifests in terms such as information overload, the pressure to remain constantly connected, and the need to adapt to new technological platforms (Fernández-Fernández et al., 2023). Additionally, distractions from digital technology, such as mobile phones and social media, impair students' ability to focus in class (Upadhyaya & Vrinda, 2020). Some previous studies have focused on academic performance in foreign countries, and there is limited research on private university students in Malaysia. Technostress has been primarily studied in the commercial and industrial sectors, but its impact on the academic performance of private university students in the Klang Valley remains understudied. Moreover, previous research often examined single dimensions of technostress, neglecting the combined effects of multiple technostress dimensions and social factors on academic performance. Additionally, the role of student engagement as a mediator that mitigates the negative impact on academic performance has not been studied. Furthermore, time management skills have been examined, but limited studies have investigated how factors such as self-regulated learning, socialization activities, and prioritization skills interact to influence academic performance. Lastly, some previous research has investigated various factors that affect student engagement; however, there remains a lack of studies examining student engagement as a mediator between these factors and academic performance.

Therefore, this study aims to investigate the influence of time management skills and technostress dimensions on academic performance, with student engagement as a mediating factor, thereby contributing to the improvement of student academic success and well-being in private university environments. This study contributes by proposing a conceptual framework that combines time management skills and technostress within the framework of the Study of Demand-Resources Theory. Moreover, it also draws

attention to the mediator, student engagement, which has not been examined in Klang Valley private universities. Hence, this framework can guide future researchers and universities in improving students' academic performance and well-being.

2.0   Theoretical Background, Literature Review, and Hypotheses Development

2.1   Underpinning Theory - Study Demand-Resources (SD-R) Theory

The Study Demand-Resources (SD-R) Theory is an extension of the Job Demand-Resources (JD-R) framework developed by Demerouti et al. (2001) and later adapted for educational contexts by Demerouti and Bakker (2011). The SD-R model created by Lesener et al. (2020) explains how the balance between academic demands and available resources determines students' well-being and academic outcomes. According to this theory, excessive demands, such as technostress, may lead to emotional exhaustion and disengagement, while adequate resources, like effective time management, can enhance motivation and performance. In addition, Salmela-Aro et al. (2022) emphasise that student engagement is the motivational pathway through which this dynamic unfolds. In the context of this study, technostress is conceptualised as an academic demand, and time management is viewed as a personal resource. Student engagement is included as a key mediating mechanism linking these factors to academic performance. This study does not treat burnout as a separate construct since the negative outcomes of burnout, such as exhaustion and demotivation, are already encapsulated within the dimensions of technostress (Kuadey et al., 2023; Zhao et al., 2021). This allows for a more streamlined conceptual model.

2.2   Time Management Skills

Time management skills refer to the ability to schedule, coordinate, and manage the time spent on specific tasks to enhance academic productivity (Claessens et al., 2007). One of the important areas of educational psychology research is the relationship between student engagement and self-regulated learning (Liu, 2022). According to Broadbent et

al. (2022) and Calonia et al. (2023), three key components of time management skills are considered essential for successfully managing academic tasks: self-regulated learning, socialisation activities, and prioritisation abilities.

2.2.1   Self-Regulated Learning

According to Zimmerman (1989), self-regulated learning is a proactive process where students set learning objectives, monitor their progress, and evaluate the success of their strategies to adapt them for further development. Self-regulated learning (SRL) has been shown to positively impact student engagement and academic performance. Xu et al. (2022) emphasised that there are SRL techniques, such as self-evaluation, metacognitive regulation, and effort regulation, which significantly predict higher GPAs during online learning. Studies indicate that effective time management, including self-regulated learning, is correlated with higher engagement and better academic outcomes (Wolters & Brady, 2020). Self-regulated study enhances content retention and understanding by allowing students to learn in their preferred style and repeat difficult subjects (Buchanan & Mooney, 2022). Research by Wang and Wang (2024) categorises self-regulated study into self-paced study and item selection, demonstrating that students who control their study time and material selection tend to improve their memory performance. According to Odum et al. (2021), self-study activities enhance student participation in active learning environments by facilitating greater involvement in group projects and class discussions. Hence, the following hypotheses are proposed:

H1a: Self-regulated learning has a direct and positive effect on academic performance.

H1b: Student engagement acts as a mediator in the relationship between self-regulated learning and academic performance.

2.2.2   Socialisation Activities

Socialisation activities refer to structured and informal interactions between students and academic staff that help students integrate into the academic community (Weidman,

2020). These activities foster a sense of belonging, enhance communication skills, and promote motivation (Gopalan & Brady, 2019; Yoel et al., 2022). They also facilitate cultural understanding, empathy, and peer collaboration, which are crucial for academic growth (Al-Maskari et al., 2021; Schwerter et al., 2024). Empirical studies suggest that social integration has a positive impact on academic outcomes by increasing students' engagement, motivation, and persistence. Thus, it is expected that socialisation activities contribute directly to improved academic performance. However, this relationship may also be explained by student engagement, which acts as a mediating mechanism. Engagement refers to the level of involvement and interest students demonstrate in their learning processes, where socialisation activities can enhance this engagement by creating a supportive and stimulating learning environment.

H2a: Socialisation activities directly and positively influence academic performance.

H2b: Student engagement mediates the relationship between socialisation activities and academic performance.

2.2.3   Prioritisation Skills

Prioritisation skills mean organising tasks based on urgency, for example, ranking them from most to least urgent (Covey, 1989). These skills are essential for students, as they help manage their personal, extracurricular, and academic tasks effectively (Wolters & Brady, 2020). Students who prioritise well will allocate more time to important tasks, focus on their studies, participate in class, and complete assignments before deadlines (Calonia et al., 2023). Prioritisation also helps students balance academic and non-academic areas, promoting overall growth and development (Ali et al., 2022). Additionally, effective prioritisation enhances students' well-being by providing them with a stronger sense of control over their academic and personal lives (Calonia et al., 2023). Goal planning is another key component that enables students to set academic goals and align tasks with their objectives efficiently (Sajeevanie, 2020). Through effective planning, students can focus their attention and energy on tasks that support

their goals, thereby increasing their academic engagement and performance. Hence, the following hypotheses are formulated:

H3a: Prioritisation skills directly and positively influence academic performance.

H3b: Student engagement mediates the relationship between prioritisation skills and academic performance.

2.3   Technostress

Technostress refers to the stress that arises from using digital technologies, particularly when users struggle to adapt to or are overwhelmed by these tools (Brod, 1982). Ragu-Nathan et al. (2008) identified five dimensions of technostress: techno-overload, techno-complexity, techno-invasion, techno-insecurity, and techno-uncertainty. For educational settings, Molino et al. (2020) and Upadhyaya and Vrinda (2020) highlight three key dimensions most relevant to university students: techno-overload, techno-complexity, and techno-invasion.

2.3.1   Techno-Overload

Techno-overload refers to the stress that students experience when they use various digital platforms for academic purposes. It requires students to dedicate more study time and possess faster processing speeds (Kumar, 2024; Upadhyaya & Vrinda, 2020). Techno-overload causes both physical and cognitive strain, especially when students switch between various digital tools such as digital libraries, social media, video conferencing, and e-learning platforms (Grandhi et al., 2009; Haleem et al., 2022; Turnbull et al., 2023). Moreover, this causes an increase in stress, anxiety, and burnout (Califf & Brooks, 2020). Previous findings suggest that techno-overload can reduce student engagement and productivity, while excessive technology use has a negative impact on both social-emotional and academic growth (Upadhyaya & Vrinda, 2020). Students in high digital-demand environments often experience disengagement due to

emotional exhaustion and a lack of motivation and concentration (Wang et al., 2021). Hence, the following hypotheses are formulated:

H4a: Techno-overload directly and negatively influence academic performance.

H4b: Student engagement mediates the relationship between techno-overload and academic performance.

2.3.2   Techno-Complexity

Techno-complexity is the stress experienced when digital tools are difficult to learn or use (Kumar, 2024; Upadhyaya & Vrinda, 2020). According to Saleem et al. (2024), high levels of techno-complexity reduce academic productivity and the quality of online learning experiences. The relationship between techno-complexity and student engagement has been studied, with findings indicating that it decreases motivation and passion. Additionally, students facing high techno-complexity are more likely to experience burnout, which further reduces their engagement and participation in class activities (Wang et al., 2021). Moreover, prolonged exposure to techno-complexity can contribute to academic burnout, a state of emotional exhaustion and detachment from learning activities. Burnout, in turn, diminishes students' willingness to participate in class discussions, complete assignments, or engage in collaborative learning, ultimately impairing their academic performance. Therefore, student engagement is likely to act as a mediating factor in this relationship, explaining how the negative effects of techno-complexity translate into poorer academic outcomes. Thus, it is hypothesised as follows:

H5a: Techno-complexity directly and negatively influence academic performance.

H5b: Student engagement mediates the relationship between techno-complexity and academic performance.

2.3.3   Techno-Invasion

Techno-invasion refers to the intrusion of technology into personal time, making it difficult for students to disengage from academic tasks (Kumar, 2024; Upadhyaya & Vrinda, 2020). This constant connectivity disrupts rest and impacts emotional and cognitive functioning (Saleem et al., 2024). It has also been found to reduce student engagement, with students feeling overburdened by technology demands, resulting in decreased participation in academic activities (Aziz et al., 2021b). Moreover, engaged students are more likely to achieve higher academic results; however, techno-invasion can reduce their emotional, behavioural, and cognitive engagement (Cao et al., 2023). While student engagement is a key predictor of academic performance, techno-invasion can diminish this engagement by contributing to burnout and a decline in academic enthusiasm. Therefore, it is plausible that student engagement serves as a mediating variable that explains how techno-invasion ultimately affects academic outcomes. Hence, the following hypotheses are formulated:

H6a: Techno-invasion directly and negatively influence academic performance.

H6b: Student engagement mediates the relationship between techno-invasion and academic performance.

2.4   Student Engagement

Student engagement refers to the level of attention, interest, motivation, emotion, and curiosity that students show while learning (Sabbott, 2016). In educational research, the relationship between student engagement and academic performance has been extensively studied. Chen et al. (2023) stated that in higher education, a high level of engagement is considered a strong predictor of both academic performance and personal development. The study by Schnitzler et al. (2020) and Sukor et al. (2021) found that academic performance and overall student participation were substantially positively connected, with emotional and cognitive engagement having the most significant effects. Moreover, a study among university students in the Klang Valley by Chan and Dai (2023) found that student engagement is a significant factor influencing students' academic

performance. Students who participate in many academic activities both inside and outside of the classroom have a higher level of academic performance. Thus, it is hypothesised as follows:

H7: Student engagement directly and positively influence academic performance.

2.5   Academic Performance

The term' academic performance' refers to the level of achievement that the students gain in their academic journey. It can be defined from multiple perspectives, including educational, psychological, sociological, cognitive, behavioural, technological, time management, and institutional viewpoints. Table 1 presents the definitions of academic performance across these multiple dimensions.

Table 1: Definitions of Academic Performance

Perspectives	Definition	Sources
Educational	Academic performance is measured through GPA, test scores, and coursework outcomes.	Credé and Kuncel (2008)
Psychological	Influenced by motivation, self-efficacy, and learning strategies.	Honicke and Broadbent (2015)
Sociological	Shaped by family background, social class, peer influence, and parental education.	Sirin (2005)
Cognitive	Relates to intellectual abilities such as memory, reasoning, and processing speed.	Alloway and Alloway (2009)
Behavioural	Observable behaviours, such as attendance, class participation, and study routines, reflect performance.	Credé et al. (2010)
Technological	Evaluated in relation to students' use of digital tools, technostress, and online learning platforms.	Dubovi and Tabak (2020)

Perspectives	Definition	Sources
Time Management	Strongly influenced by the ability to organise, prioritise, and manage academic tasks efficiently.	Britton and Tesser (1991)
Institutional	Defined by academic progress indicators like graduation rates, credits earned, and academic standing.	Kuh et al. (2006)

This study adopts both technological and time management perspectives. These perspectives align with this study's focus on the impact of digital demand and time management strategies on students' academic performance (Dubovi & Tabak, 2020; Britton & Tesser, 1991). Academic performance is a key indicator of a student's future success and is influenced by various factors. Cognitive abilities, including memory, reasoning, and problem-solving, play a significant role in predicting academic outcomes (Ren et al., 2020; Shi & Qu, 2022). Personal characteristics, including motivation, self-discipline, and emotional regulation, also contribute. Students who are intrinsically motivated and capable of managing stress tend to perform better academically (Córdova et al., 2023; Abdulrahman et al., 2023). The educational environment has a notable impact. Supportive classroom dynamics, high-quality instruction, and institutional resources, such as mentoring or tutoring programs, enhance student engagement and academic success (Moussa & Ali, 2021). To enhance students' academic performance, some factors should be addressed at the individual, university, and social levels. The most cited factors that affect academic performance from previous studies are (1) high level of technostress (Ali et al., 2024; Cataldo et al., 2023), (2) poor time management (Alyami et al., 2021), (3) social media distraction (Shahzad et al., 2024), (4) mood states (Hernandez et al., 2024), (5) sleep quality (Madani et al., 2024), (6) lack of student engagement (Hanaysha et al., 2023). Therefore, research supports the notion that challenges such as technostress, inadequate time management skills, and a lack of student engagement are related to poor academic performance.

3.0   Research Framework

In this study, academic performance is identified as the dependent variable (DV). The independent variables (IV) include three dimensions of time management skills, which are self-regulated learning, socialisation activities, and prioritisation skills, and three dimensions of technostress, consisting of techno-overload, techno-complexity, and techno-invasion. Moreover, student engagement serves as the mediator variable, which is hypothesized to mediate the relationship between the independent variable (IV) and the dependent variable (DV). Figure 1 illustrates the conceptual framework of this study based on the hypothesis development and evaluation of related literature.
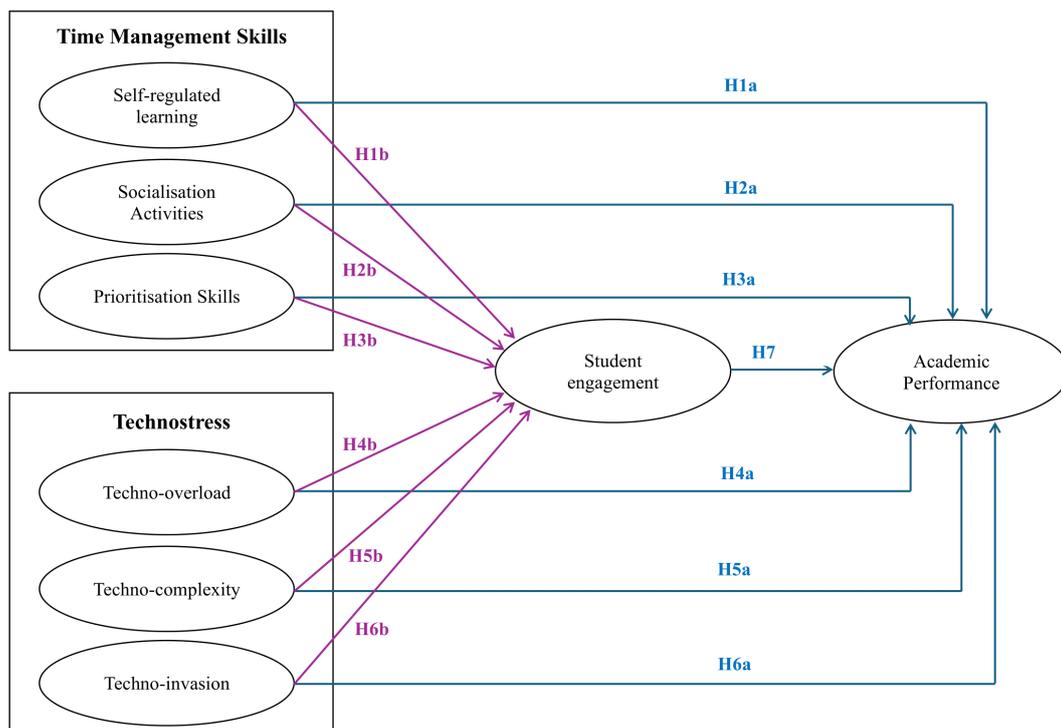

Figure 1: Conceptual Framework

4.0   Methodology

4.1   Research Design

This research employs a quantitative correlational approach, utilising a cross-sectional design. The design was chosen because the study examines the relationships between multiple variables, which include independent variables (IVs), a mediator, and a dependent variable (DV). The design was selected because this approach uses a single method for gathering and analysing data, whereas quantitative methods for both data collection and analysis generate and utilise numerical values (Bell & Bryman, 2006). This method enables the researcher to gather data from a large sample at a single point in time, making it suitable for testing hypothesized relationships using statistical techniques such as structural equation modelling.

4.2   Population and Sampling Method

This study focuses on private university students in the Klang Valley. Private universities are defined according to classifications by the Ministry of Higher Education, excluding university colleges and private colleges due to structural and academic differences. According to Pelan Tindakan Pendidikan Tinggi Malaysia 2023, there are approximately 53-54 private universities in Malaysia, with Selangor and Kuala Lumpur (KL) having 173 and 149, respectively (Malaysia Indicator, 2019). Moreover, as of 2021, 517,580 students were enrolled in private universities. According to a recent survey by Anthonysamy et al. (2020), the Klang Valley and central area of Malaysia are home to over 68% of the country's private universities, with half of the 517,000 students attending universities in Kuala Lumpur and Selangor. The region's dominance in private universities is despite the lack of separately published enrolment figures.

Convenience sampling was adopted as the sampling technique due to the large and dispersed population. Since there is no sampling frame for the chosen target population, the non-probability sampling techniques will be employed. The samples are picked based on accessibility (Pace, 2021). Participants will be screened based on their level of study, and data-cleaning procedures will be conducted to remove inconsistent

responses. This approach has been supported by previous studies, such as those by Nikolopoulou (2022) and Golza et al. (2022), which emphasize the importance of detailed documentation of inclusion criteria and proper screening for sample validity. Implementing rigorous checks, such as attention filters and excluding invalid responses, can mitigate bias and improve data quality.

The sample includes undergraduate to postgraduate-level students from selected institutions. According to Hair (2010), a minimum sample size of 200 is recommended for Structural Equation Modeling (SEM) when the model includes multiple constructs and complex relationships. As this study encompasses seven constructs and a mediation pathway, a larger sample size is necessary to ensure accurate parameter estimates and model fit. Furthermore, Cohen (1992) also emphasized that a sample size of 300 provides sufficient statistical power (usually 0.80) to identify medium effect sizes in multivariate analyses. Krejcie and Morgan (1970) also recommend using a sample of approximately 300 respondents for a population exceeding 1,000. Additionally, previous studies on technostress and academic performance, such as those by Mahapatra et al. (2023) and Wang et al. (2020), have employed comparable or smaller sample sizes. Therefore, 300 is a reasonable standard for generalisability and comparability in the context of Malaysian private university students.

4.3   Data Analysis

The study will use Smart PLS 4.0 for data analysis. The analytical process involves initial data screening and descriptive statistics, followed by an assessment of the measurement model for construct reliability and validity. The structural model will then be evaluated to test the hypotheses. The Structural Equation Modelling (SEM) with the Partial Least Squares (PLS-SEM) approach will be used for exploratory research and robust handling of complex models (Hair, 2010). This study employs higher-order constructs (HOCs) to model complex variables, such as technostress and student engagement. This approach enhances model parsimony and mitigates risks of multicollinearity and redundancy (Hair et al., 2022; Podsakoff et al., 2003). In mediation analysis, HOCs enable the assessment of the combined indirect effect of sub-constructs through a single mediator, offering a

more holistic and theoretically consistent understanding of their influence on academic performance.

4.4   Research Instrument

The research instrument is a structured questionnaire comprising items adapted from validated scales in prior studies. Eight key constructs are measured using multi-item statements on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). According to Bujang et al. (2024), a minimum of 30 respondents is recommended for a pilot study to assess the reliability and validity of the questionnaire. Therefore, this study will conduct a pilot test with 30 participants. Constructs and their sources include: Broadbent et al. (2022) for self-regulated learning, Calonia et al. (2023) for prioritisation, Hanaysha et al. (2023) for student engagement, Alzabidi et al. (2024) for academic performance, and Wang and Wang (2024) for technostress dimensions.

5.0   Implications

This study is expected to offer theoretical, practical, and academic contributions. Theoretically, this study aims to extend the application of the Study Demand-Resources (SD-R) Theory to the higher education context by integrating both internal resources (time management skills) and external demands (technostress) factors influencing academic performance. By adopting this approach, this study demonstrates the potential of SD-R Theory in explaining how students are likely to handle academic challenges in this digital learning environment. Practically, the expected outcomes suggest that improving academic results requires increasing student engagement. Universities and educators are expected to benefit from understanding that technostress is a psychological factor that can impact students' performance if left unaddressed. Moreover, improving students' socialisation activities, self-regulated learning, and prioritisation skills may serve as protective factors that support their academic success and engagement. These expectations can provide a foundation for updating teaching methods, support systems, and educational standards to better address the evolving needs of students. Academically,

this study aims to contribute to the expanding body of literature on technostress and student engagement by providing new insights into the application of SD-R theory in the context of private universities. Moreover, it opens up an opportunity for future research to investigate these relationships across various educational settings and student populations. The study's framework could guide lecturers and academic policymakers in designing training programs aimed at enhancing students ' academic resilience in technologically advanced learning environments.

6.0   Conclusion

Academic performance is a key indicator of the nation's overall human capital quality and its impact on students' future job prospects. In the modern digital learning environment, it is more crucial than ever to understand the underlying elements that either support or hinder academic success as students face increasing cognitive demands and constant connectivity. This study advances knowledge by providing insights into the relationships and interactions among behavioural, psychological, and technical factors in students' experiences. Beyond theory, the results give stakeholders in education practical recommendations. The findings emphasise to policymakers the importance of improving digital literacy and mental health programs in higher education. Educators can utilise these findings to create learning environments that foster engagement while teaching essential life skills, such as time management.

For institutions, the findings can be advantageous by rethinking student support services and moving away from reactive to proactive tactics that encourage long-term academic progress. Moreover, institutions should integrate time management and self-regulated learning modules into the curriculum by offering stress management workshops, implementing peer mentoring, and digital detox initiatives. For future researchers, exploring additional moderating or mediating factors such as emotional intelligence or digital literacy may provide a deeper understanding of how students manage academic demands in digital learning environments. By doing this, we develop graduates who are more resilient, driven, and prepared for the future, in addition to improving academic results. Future research should investigate the longitudinal effects

of technostress and time management on academic performance and explore additional mediators or moderators, such as emotional intelligence, digital literacy, and coping strategies. Research conducted on a range of student demographics and learning environments will enhance the generalisability of the findings.

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