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# Technostress factors among students in the adoption of Generative Artificial Intelligence (GenAI) in higher education: A rapid review narrative

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**Abstract:** The usage of artificial intelligence (AI), particularly within higher education institutions (HEIs) is driving the increasing rate of technological stress known as technostress. This study seeks to look into the factors causing technostress among higher education students in the adoption of generative artificial intelligence (GenAI) and to propose mechanisms for mitigating the effects. To achieve this objective, a rapid literature review was used in exploring existing and recent research publications relevant to the research topic and objective. The study found factors such as techno-overload, techno-invasion, and many more as factors contributing to technostress among students of higher education. The results indicate the detrimental impact of technostress on students' academic achievement and general mental wellness, stressing the need for more research.

**Keywords:** AI, Artificial intelligence (AI), GenAI, Generative AI, Higher education institutions (HEIs), Mental stress, Psychological stress, Technostress

## Introduction

Technostress among students is prevailing in the digital age which can be defined as psychological exhaustion and stress, associated with the use of technology. This psychological stress is a growing issue among students with regard to the adoption of artificial intelligence (AI) in higher education institutions (HEIs). This problem now attracts attention among scholars intending to investigate its impact, challenges, and many more, with a particular emphasis on higher education students. Also, HEIs are making substantial investments in educational-aided technology towards making teaching and learning better and easier. According to Wang, et al. (2020), technostress is a challenge for students due to the expected efforts and time demanded from the students to master the growing features of these educational tools and technologies.

This rapid literature review study provided the ground for further studies in synthesizing the existing body of academic literature studies on technostress with an emphasis on understanding its impact on higher education students' academic process, performance, and overall well-being. Pourahmad and Koc (2023) in a review paper outlined the academic literature gaps on the importance and benefits of technostress, highlighting the necessity for applying different scientific methods to understand the growing phenomenon. The above literature study shows that technostress is prevalent in today's technologically advanced world with a serious

threat that affects many industries, including education. The growing concern calls for a deeper and more comprehensive study to provide proactive management to handle and lessen its consequences on users like students and organizations alike. Then, this study seeks to investigate the main technostress factors that affect students when utilizing GenAI tools in higher education.

## Background of the study

Considering today's higher education, concerns about technostress have become more prevalent particularly as the application of AI increases. A person can feel technology stress in several ways, such as invasions of their private life, feelings of overload, or nervousness over their technology skills (Tarafdar et al., 2015; Upadhyaya, 2021). According to this study, people who experience stress due to their interaction with technologies like AI are said to be undergoing technostress. The rapid shift to remote and online learning spurred by the COVID-19 epidemic has exacerbated the issue of technostress by requesting students to balance their academic responsibilities with the new and emerging technological tools and platforms (Ali, 2020). Research suggests that a number of factors including techno-complexity, techno-overload, and more contribute to technostress, which has a substantial impact on students' academic progress and outcomes.

The techno-complexity focuses on challenges in using technology, while techno-overload looks into the unreasonable demands and expectations placed on technology users (Dragano & Lunau, 2020; La Torre et al., 2019). Additionally, limited knowledge of digital literacy and technical support also promotes technostress which has direct implications for the learning process and settings (Atanasoff & Venable, 2017). Although technostress is gaining attention across organizations, there is a dearth of research focusing on students and academics in Africa, and South Africa in particular. This study seeks to close the literature gap by examining how technostress impacts higher education students in South Africa and proposing coping strategies for managing the negative impacts on their productivity and academic performance. Understanding these factors equips higher education institutions in assisting students to be informed on better ways to use technology effectively in order to improve their academic progress, process, performance, and experience.

## Literature review

### Technostress an overview

Technostress can be seen as a form of psychological or mental stress characterized by negative impacts on people's attitudes, ideas, behaviors, and general mental health that result from using technology. This form of stress keeps increasing as more students in higher education and institutions turn to the use of modern technologies such as artificial intelligence (AI) and generative artificial intelligence (GenAI). Back in history, the term "technostress" was coined by clinical psychologist Craig Brod in the early 1980s to refer to a form of stress that shows confusion, anxiety, panic attacks, as well as physical signs and symptoms (Brod, 1984). According to Brod (1982) and Weil and Rosen (1997), anxiety is the main factor in relation to technostress that leads to the disruption of work routines and reduces one's ability to achieve and complete successful work. This is detrimental to a person's psychological and physiological well-being, stemming from the massive pressure and demands to use technology, as a result, anxiety, mental fatigue, and depression erupts (Pothuganti, 2024; Salanova, et al., 2013; Brod, 1984; Tarafdar, et al., 2015).

This technostress is characterized by worry, frustration, and feeling overwhelmed which can sprout from one trying to adjust to novel technological changes and innovation (Weil & Rosen, 1997; Tacy, 2016). This then triggers phobia, and depression, and can lead to other psychological disorders as users try to keep up with these technologies (Weil & Rosen, 1997; Tacy, 2016). However, according to Pothuganti (2024), Salanova, et al. (2013), Brod (1984), and Tarafdar et al., (2015), the major impacts of technostress are mental fatigue, anxiety, and fear.

## Problem statement

Technostress is the term used to describe the stress that people suffer as a result of their dependence on technology or their inability to properly adapt or use technology in a way that is healthy and can bring great productivity. Some of the many causes of technostress are techno-invasion (the encroachment into private life), techno-overload (overbearing expectations from technology), techno-complexity (the problems of utilizing technologies), techno-insecurity (being afraid of losing a livelihood simply because of technology),

and techno-uncertainty (a lack of sense regarding using technologies) (Cook & Van Belle, 2022). The term technostress is mostly seen negatively, but there are some situations in which it might benefit students. For example, the pressure to adapt to new technologies can enhance the students' digital literacy, resilience, and problem-solving skills.

As students continue to navigate the growing technological complexity, flexibility then resilience is becoming important traits in the modern digital age (Kulikowski et al., 2022; Wang et al., 2020). Researchers believe that technostress can impede learning progress, perception, attitude, and motivation (Pourahmad & Koc, 2023). Technology advancements like GenAI can cause some feelings of stress, with some students seeing technology as helpful while others might envision this as stress. Technostress can also encourage students to become more involved in their educational pursuits. The ability and proactiveness of students to strategically manage the advancing nature of technology can be a source of acquiring knowledge, leading to more involvement in the learning process (Kulikowski et al., 2022; Zhao, Wang, Wu & Dong, 2021).

Whenever students successfully overcome the difficulties that are presented by technostress, it creates a sense of accomplishment in the students which further pushes them to improve their academic accomplishments (Abd Aziz et al., 2021; Kulikowski, et al., 2022). Although earlier research has shown that technostress has detrimental effects, few studies have examined students in higher education (Wang, et al., 2020). Furthermore, students look up to their peers for assistance in overcoming technological obstacles, as a result, the feeling of technostress can also foster teamwork among students, also, strengthening their social networks and collaborative skills (Kulikowski et al., 2022; Rayan et al., 2017).

Technostress, according to past scholars, can promote student collaboration, increase participation, and foster individual development to pose problems. Furthermore, technostress could have a major detrimental effect on higher education students' involvement, productivity, and academic achievement. Such stress levels could have risen as a result of several factors like the COVID-19 pandemic's promotion of ICT for distance learning, which required students to adjust to new learning environments and technologies. Along with symptoms like anger and low motivation, this can also cause physical symptoms like headache, gastrointestinal problems, insomnia, and high blood pressure (Cook & Van Belle, 2022). In order to promote students' success and well-being, higher education must address the detrimental effects of technostress on student's academic performance (Cook & Van Belle, 2022). Adding to existing literature, this study intends to investigate the main technostress factors that students encounter when utilizing AI tools like GenAI in higher education.

## Research objective and question

**Research objective:** To investigate the key technostress factors experienced by higher education students in the adoption of GenAI tools.

**Research question:** What are the key technostress factors experienced by students in the adoption of GenAI tools in higher education?

## Research methodology

The alternative to systematic literature review (SLR) is rapid reviews (RRs). As the name sounds, rapid review can be completed in a shorter time than SLR with a unique objective, and format, and used to synthesize evidence (Smela et al., 2023). Rapid reviews are primarily used in a situation with limited time to conduct the study. In the context of the research topic, the methodologies and principles of rapid reviews were effectively applied.

Rapid reviews were used to synthesize empirical evidence quickly while retaining high academic rigor that reduced bias in the study. Notablely, rapid review methodology is mostly used in fast-evolving disciplines, fields, or subjects such as GenAI in education which requires a timely insight for stakeholders in decision-making. However, the effectiveness of rapid review demands a clear, comprehensive. unambiguous and concise research topic and question. For this study, a suitable question like: "What are the key technostress factors experienced by students in the adoption of Artificial Intelligence tools in higher education?" was used. According to Haby et al. (2023), a comprehensive, concise, and clear research question defines and guides the whole rapid review process ensuring that the search is organized, focused, and relevant.

### Search process

Developing a search process is fundamental in research to ensure a systematic approach is followed. The process allows the researcher to search academic databases for resources. For instance, PubMed, Scopus, ERIC, and Google Scholar were searched with keywords like "technostress," "higher education institutions", "Artificial Intelligence," "higher education," and "students". The inclusion criteria for the study included studies published in the last Ten years, published in the English Language, with a focus on empirical research related to technostress in educational settings and the keywords. The exclusion criteria involve materials that were not published in the last ten years, are not published in the English language, and have no focus on the keywords and Technostress in general. The application of this search process and protocol enhances transparency and reduces duplication of efforts (Tricco et al., 2016).

## Discussion of the findings

### The key technostress factors experienced by students

The factors influencing technostress include an individual's experience with technology, age, perceived control over technology, and the organizational climate in which they operate (Brod, 1984). The literature suggests that technostress can lead to decreased performance and innovation, highlighting the need for strategies to enhance technology self-efficacy and information systems literacy among users (Tarafdar et al., 2015) especially higher education students.

The contributing factors of technostress include techno-complexity, which refers to the challenges posed by complex technologies; techno-invasion, characterized by the blurring of boundaries between work and personal life; techno-insecurity, stemming from fears of job loss due to technological advancements; techno-overload, resulting from excessive information and communication demands; and techno-uncertainty, which involves the unpredictability of technology changes (Ragu-Nathan et al., 2008; Khlaif et al., 2023).

### Technostress among students

Technostress among students refers to the psychological and physiological stress that arises from using technology in educational contexts. This phenomenon has become increasingly relevant with the rise of online learning, where students often face challenges related to technology, which can lead to feelings of frustration, anxiety, and feeling overwhelmed. Saleem et al. (2024) defined technostress as the negative experience and consequence people encounter with new or unfamiliar technology, which may significantly impair their ability to learn.

According to the study, technostress may have a detrimental effect on students' cognitive skills (capacities), including their capacity for attention, understanding, memory, and learning in general. For instance, Upadhyaya and Vrinda (2021) found that students who were overwhelmed by educational technology in their online learning environments often experienced significant levels of technostress, which negatively impacted their academic journey and achievement. Students' intentions to participate in virtual education were adversely connected with technostress, suggesting that higher levels of technostress may reduce both academic motivation and fulfilment (Awang et al., 2022).

Additionally, the more screen time based on online learning, the greater the chance of physical and mental health issues associated with technostress. Vandendriessche et al. (2019) suggest that prolonged screen usage could result in eye strain, migraines, and insomnia. According to Vallone et al. (2023) and Torales, et al. (2022), isolation commonly occurs in online learning environments which are associated with mental health issues like anxiety, depressive disorders, and more. Technostress in higher education is a developing worry because it affects students' general well-being and academic performance. To help students mitigate the effects of technostress and enhance their virtual learning knowledge, lecturers and higher education institutions must implement efficient support systems in response to the problems presented by technology use in higher educational contexts (Saleem et al., 2024).

## Summarised influencing factors of technostress

To this point, technostress is worrisome in the adoption of GenAI in higher education. The study pinpoints several important technostress that higher education students encounter while employing GenAI, which can

have a big influence on their academic process, performance, emotional development, and general well-being. Below is a thorough explanation of these factors:

1. **Techno-overload:** This happens to students when they feel pressured to work longer and faster because of technological demands as they are not coping with the fast pace of its advancement and development. For example, students might encounter feelings of overwhelm and overload as they juggle multiple technological platforms in combination with their academic responsibilities. This constant pressure has been proven to cause mental fatigue, high levels of stress, and a decline in academic performance (Abd Aziz & Yazid, 2021; Ahmad & Amin, 2012). Also, ongoing stress might lead to student burnout (Li & Wang, 2020).
2. **Techno-invasion:** This factor explains that technology impacts people's daily lives, making it more difficult to discern between commitments to one's studies and leisure activities. Students frequently struggle to set aside their coursework because online conversations and notifications disrupt their private lives. This intrusion may result in a conflict between the home and academics, which can make it hard for students to balance their personal and academic obligations and raise the risk of stress, depression, and anxiety (Abd Aziz & Yazid, 2021; Tarafdar et al., 2020).
3. **Techno-complexity:** It arises from students' challenges in understanding and using various kinds of technological tools and platforms. Since technology is developing so quickly, students have to constantly adjust to new systems, which is frightening to them. For instance, the intricacy of learning management systems along with other learning technologies are causing students to become dissatisfied and perform less successfully academically (Abd Aziz & Yazid, 2021; Qi, 2019). Despite being digital natives, many students still lack the knowledge, skills, or experience necessary to use the continuously growing complex technological tools (Abd Aziz & Yazid, 2021).
4. **Techno-insecurity:** Students' perceptions of their technical inadequacy are reflected in this factor. Students who believe they lack the skills necessary to succeed in a technologically driven world may experience performance anxiety. This lack of confidence may hinder their ability to engage with the learning technology and negatively impact their academic performance (Abd Aziz & Yazid, 2021; Ma & Turel, 2019). The fear of falling behind or not reaching objectives when utilizing technology may exacerbate stress levels even more.
5. **Techno-uncertainty:** This alludes to the often unexpected character of technical advancements, including the frequent releases and changes made to technology and its infrastructure. Based on the continuous changes, students can feel anxious and unprepared to adapt and use the new technology and its features because of a lack of support from higher education. According to Abd Aziz and Yazid (2021), and Tarafdar et al. (2020), higher education is failing to provide the necessary support to assist students in navigating the current technology changes to avoid technostress and confusion.

The above critical technostress factors are to be addressed to enable students to use technology appropriately in promoting their academic expectations, experience, academic performance, and overall well-being (Abd Aziz & Yazid, 2021).

## Mitigating technostress among students

Reducing technological stress is critical to facilitating effective usage of education-aided technology for online learning and non-academic situations, as well as overall mental well-being. Higher education institutions and educators should continue to provide effective measures to cut the negative impacts of technostress that causes feelings of fear, despair, anxiety, depression, discontent, and reduced academic engagement and performance. To mitigate the technostress:

One major tactic to reduce technostress is to establish strong and effective institutional support. This support will assist higher education in providing students with concise guidelines, instruction, and resources to equip students to manage online learning pressure (Saleem et al., 2024). For example, HEIs should provide a “teaching presence” that focuses on clear guidelines and instruction on the efficient use of online-aided technology (Awang Kader et al., 2022). These types of proposed interventions. guidelines and instructions

will eliminate the feeling of nervousness and increase confidence when adopting and using GenAI and other technology tools in higher education.

The demand is on higher education to reduce technostress through investment in technological infrastructure and support systems. The investment will present the opportunity to provide relevant training, workshops, and resources that promote students' proficiency in technical skills like troubleshooting which will enable them to use online learning platforms (Saleem et al., 2024). Additionally, the technical skills and abilities will enable students to develop a sense of belonging in the learning process that allows them to manage and mitigate the loneliness that is linked to online learning (Saleem et al., 2024).

A standard and supportive environment is essential for an effective online learning process towards reducing technostress. Establishing a standard environment and guidelines for online learning promotes collaboration among students and reduces technostress (Saleem et al., 2024). Lecturers and educators can provide continuous feedback, reflection, contact information, and guidance in the online learning environment to assist students in feeling valued and understood. Workshops and training can be organized by HEIs to assist students and lecturers in becoming more tech-savvy and stress-tolerant when adopting and using GenAI in higher education. According to Saleem et al. (2024), workshops and training can help students learn and understand proper ways to control their technology use and cope with any stress it may create.

Also, a multifaceted mechanism such as the provision of supportive online learning space, operative lecturer support, and resources towards reducing technostress on higher education students. Implementing these tactics by HEIs into practice, offering supportive and effective digital education policies empowers students with the skills and abilities to mitigate the challenges of technostress and improve their overall educational learning process and experiences (Saleem et al., 2024; Gabbiadini et al., 2023; Wang et al., 2023).

## Recommendations and future study

- **Technostress management programs:** HEIs must develop and implement all-embracing programs to address students' technostress levels. These programs should empower students with coping skills to handle technological stress, challenges, and demands. Such programs include workshops, seminars, and training on computer literacy, time management, stress management, and a sense of fulfillment. Furthermore, HEIs can develop programs such as counseling, group therapy, and peer support groups to help students overcome the challenges of technostress. Also, HEIs might develop an effective educational space that promotes students' resilience, confidence, and overall well-being.
- **Improve digital literacy and training:** To overcome technostress, HEIs should improve students' digital literacy by designing dedicated education programs. The programs can introduce students to different educational-aided technology tools and platforms to enable them to reduce any form of GenAI challenges and complexity and increase their technology confidence and abilities. Also, preparing students to use GenAI tools and many other educational-aided technologies will assist students in effectively adopting GenAI, and their academics will be guaranteed to reduce the anxiety associated with GenAI adoption.
- **Longitudinal research on technostress:** Future research can focus on periodical or longitudinal research in exploring and understanding of the long-term effects of technostress on higher education students, their academic performance, and mental health. These studies can explore various ways students interact, their experiences with technostress, and its impacts on their academic journey. Furthermore, more research can examine the potential benefits associated with technostress like increased academic collaboration and participation. This will assist in bringing more light to the implications of technostress on student's academic and non-academic well-being. These kinds of research will assist higher education to fully comprehend the depth of the problem, and assist in discovering effective programs, processes, guidelines, and policy decisions to mitigate technostress.

## Conclusions

Technostress in the adoption of GenAI is limited in the literature. This study has discovered the factors of technostress that impact students in higher education, especially in the adoption of GenAI. The identification of technostress contributing factors is crucial for developing a positive, reliable, supportive, and productive online learning environment, as GenAI continues to grow in adoption into the academic environment and

higher education institutions in particular. The results show that two major stresses that have a detrimental impact on pupils' academic performance and general well-being are technological overload and invasion.

HEIs can proactively reduce technostress by identifying the difficulties that these factors present, as well as implementing focused management programs, improved training in the use of technology (digital literacy), and the creation of helpful tools. The study further emphasizes the necessity of continuing research to investigate the long-term impacts of technostress and to pinpoint techniques that may promote students' success in learning environments that can be improved by technology.

Furthermore, tackling technostress is essential for fostering a more positive academic atmosphere at an age in which technology is heavily incorporated into higher education as well as for raising student satisfaction and performance. HEIs can build a more resilient and involved student population, and also, improve the overall educational experience by putting students' well-being first and giving them the resources they need to deal with technostress (technological difficulties).

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## References

1. Abd Aziz, N. N., & Yazid, Z. N. A. (2021). Exploratory factor analysis of technostress among university students. *International Journal of Academic Research in Progressive Education and Development*, *10*(3), 161-175.
2. Abd Aziz, N., Kader, M. A. R., & Ab Halim, R. (2021). The Impact of Technostress on Student Satisfaction and Performance Expectancy. *Asian Journal of University Education*, 17(4), 538-552. https://doi.org/10.24191/ajue.v17i4.16466.
3. Ahmad, U. N. U., & Amin, S. M. (2012). The dimensions of technostress among academic librarians. *Procedia-Social and Behavioral Sciences*, *65*, 266-271.
4. Ali, W. (2020). Online and Remote Learning in Higher Education Institutes: A Necessity in light of COVID-19 Pandemic. *Higher Education Studies*, 10(3), 16. 10.5539/hes.v10n3p16
5. Atanasoff, L., & Venable, M. A. (2017). Technostress: Implications for Adults in the Workforce. National Career Development Association. 10.1002/cdq.12111
6. Awang Kader, M. A. R., Abd Aziz, N. N., Mohd Zaki, S., Ishak, M., & Hazudin, S. F. (2022). The effect of technostress on online learning behaviour among undergraduates. *Malaysian Journal of Learning and Instruction (MJLI)*, *19*(1), 183-211.
7. Brod, C. (1982). Managing technostress: Optimizing the use of computer technology. Personnel Journal, 61(10), 753-757.
8. Brod, C. (1984). Technostress: The human cost of the computer revolution. Reading, Mass: Addison Wesley.
9. Cook, G., & Van Belle, J. P. (2022). Analysis of technostress experienced by students at the university of cape town, during the COVID-19 pandemic. *Issues in Information Systems*, *23*(1).
10. Dragano, N., & Lunau, T. (2020). Technostress at work and mental health: concepts and research results. *Current Opinion in Psychiatry*, 33(4), 407-413.
11. Gabbiadini, A., Paganin, G., & Simbula, S. (2023). Teaching after the pandemic: The role of technostress and organizational support on intentions to adopt remote teaching technologies. *Acta Psychologica*, *236*, 103936.
12. Haby, M. M., Chapman, E., Clark, R., Barreto, J., Reveiz, L., & Lavis, J. N. (2016). What are the best methodologies for rapid reviews of the research evidence for evidence-informed decision making in health policy and practice: a rapid review. *Health research policy and systems*, *14*, 1-12.
13. Khlaif, Z. N., Khalili, F., Affouneh, S., & Tlili, A. (2023a). How remote leaning during crisis affect technostress levels experienced by academicians. *Education and Information Technologies, 28*(9), 11075–11100.

**14.** Kulikowski, K., Przytuła, S., Sułkowski, Ł., & Rašticová, M. (2022). Technostress of students during COVID-19-a sign of the time?. *Human Technology*, *18*(3), 234-249.

**15.** La Torre, G., Esposito, A., Sciarra, I., & Chiappetta, M. (2019). Definition, symptoms and risk of techno-stress: a systematic review. *International Archives of Occupational and Environmental Health*, 92(1), 13-35. 10.1007/s00420-018-1352-1

**16.** Li, L., & Wang, X. (2021). Technostress inhibitors and creators and their impacts on university teachers' work performance in higher education. *Cognition, Technology & Work*, *23*(2), 315-330.

**17.** Ma, Y., & Turel, O. (2019). Information technology use for work and technostress: effects of power distance and masculinity culture dimensions. *Cognition, Technology & Work*, *21*(1), 145-157.

**18.** Pothuganti, S. (2024). Technostress: A comprehensive literature review on dimensions, impacts, and management strategies. *Computers in Human Behavior Reports*, 100475.

**19.** Pourahmad, Z., & Koc, H. (2023, November). Analyzing the Influence of Technostress on Students: A Systematic Literature Review. In *CS & IT Conference Proceedings* (Vol. 13, No. 21). CS & IT Conference Proceedings.

**20.** Qi, C. (2019). A double-edged sword? Exploring the impact of students' academic usage of mobile devices on technostress and academic performance. *Behaviour & Information Technology*, *38*(12), 1337-1354.

**21.** Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., & Tu, Q. (2008). The consequences of technostress for end users in organizations: Conceptual development and validation. *Information Systems Research, 19*(4), 417–433. https://doi.org/10.1287/

**22.** Rayan, A., Dadoul, A. M., Jabareen, H., Sulieman, Z., Alzayyat, A., & Baker, O. (2017). Internet Use among
University Students in South West Bank: Prevalence, Advantages and Disadvantages, and Association with Psychological Health. *International Journal of Mental Health and Addiction*, 15, 118–129.

**23.** Salanova, M., Llorens, S., & Cifre, E. (2013). The dark side of technologies: Technostress among users of information and communication technologies. International Journal of Psychology, 48(3), 422-436.

**24.** Saleem, F., Chikhaoui, E., & Malik, M. I. (2024, February). Technostress in students and quality of online learning: role of instructor and university support. In *Frontiers in Education* (Vol. 9, p. 1309642). Frontiers Media SA.

**25.** Smela, B., Toumi, M., Świerk, K., Francois, C., Biernikiewicz, M., Clay, E., & Boyer, L. (2023). Rapid literature review: definition and methodology. *Journal of market access & health policy*, *11*(1), 2241234.

**26.** Tacy, J. W. (2016). Technostress: A concept analysis. *On-Line Journal of Nursing Informatics*, *20*(2).

**27.** Tarafdar, M., Pullins, E., & Ragu-Nathan, T.S. (2015). Technostress: Negative effect on performance and possible mitigations. Information Systems Journal, 25(2), 103-132.

**28.** Tarafdar, M., Tu, Q., Ragu-Nathan, T. S., & Ragu-Nathan, B. S. (2011). Crossing to the dark side: examining creators, outcomes, and inhibitors of technostress. *Communications of the ACM*, *54*(9), 113-120.

**29.** Torales, J., Torres-Romero, A. D., Di Giuseppe, M. F., Rolón-Méndez, E. R., Martínez-López, P. L., Heinichen-Mansfeld, K. V., ... & Ventriglio, A. (2022). Technostress, anxiety, and depression among university students: A report from Paraguay. *International Journal of Social Psychiatry*, *68*(5), 1063-1070.

**30.** Tricco, A. C., Zarin, W., Antony, J., Hutton, B., Moher, D., Sherifali, D., & Straus, S. E. (2016). An international survey and modified Delphi approach revealed numerous rapid review methods. *Journal of clinical epidemiology*, *70*, 61-67.

**31.** Upadhyaya, P., and Vrinda, (2021). Impact of technostress on academic productivity of university students. *Educ. Inf. Technol.* 26, 1647–1664. doi: 10.1007/s10639-020-10319-9

**32.** Vallone, F., Galvin, J., Cattaneo Della Volta, M. F., Akhtar, A., Chua, S., Ghio, E., ... & Zurlo, M. C. (2023). Technostress and academic motivation: direct and indirect effects on university students' psychological health. *Frontiers in psychology*, 14, 1211134.

**33.** Vandendriessche, A., Ghekiere, A., Van Cauwenberg, J., De Clercq, B., Dhondt, K., DeSmet, A., ... & Deforche, B. (2019). Does sleep mediate the association between school pressure, physical activity, screen

time, and psychological symptoms in early adolescents? A 12-country study. *International journal of environmental research and public health*, *16*(6), 1072.

**34.** Wang, X., Tan, S. C., & Li, L. (2020). Technostress in university students' technology-enhanced learning: An investigation from multidimensional person-environment misfit. *Computers in Human Behavior*, *105*, 106208.

**35.** Wang, Z., Zhang, L., Wang, X., Liu, L., & Lv, C. (2023). Navigating Technostress in primary schools: a study on teacher experiences, school support, and health. *Frontiers in Psychology*, *14*, 1267767.

**36.** Weil, M., & Rosen, L. (1997). TechnoStress: Coping with technology @ work @ home @ play. New York, NY: John Wiley & Sons.

**37.** Zhao, G., Wang, Q., Wu, L., Dong, Y. (2021). Exploring the Structural Relationship Between University Support, Students' Technostress, and Burnout in Technology-enhanced Learning. *The Asia-Pacific Education Researcher*. https://doi.org/10.1007/s40299-021-00588-4.