Egyptian Journal of Community Medicine, 2025;43(1):64 -72

Egyptian Journal of Community Medicine

Technostress and its Effect on Work Productivity among Academic Staff Members at Zagazig University

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Submission Date: 2024-08-03

Revision Date: 2024-10-06

Acceptance Date: 2024-10-06

Key Words: Technostress, work productivity, academic staff, University.

A B S T R A C T

Background: Technostress is a modern phenomenon characterized by tension caused by using technology. As universities increasingly integrate digital tools into their academic environments, understanding technostress and its impact on work productivity among academic staff has become crucial. **Objective:** To assess the frequency of technostress among academic staff at Zagazig University and to determine the effect of technostress on work productivity among them. **Method:** A cross-sectional study was carried out on seven faculties in Zagazig University on academic staff who were using technology in their work-related tasks. A semi-structured questionnaire was used including sociodemographic characteristics and variables for technostress creators. The data was collected and analyzed using the SPSS program. **Results**: A total 403 staff were included. The average age was 35.5±8.2 years and 77.2% were females. Approximately 91.1% had modern computers and 54.1% received technology-related training. Significant negative correlations were detected between productivity and techno-complexity (-0.151, 0.002), techno-insecurity (- 0.236, < 0.001), and role conflict (- 0.246, < 0.001) whereas significant positive correlations were detected between productivity and techno-overload (0.246, < 0.001), techno-invasion (0.409, < 0.001), techno-uncertainty (0.558, < 0.001), and role- overload (0.330, < 0.001). Techno-uncertainty, techno-overload, techno-complexity, techno-invasion, having good Wi-Fi, job grade, age (years), and years spent on job were independently associated with productivity. **Conclusion:** Technostress is an emerged challenge for staff members, which can affect their productivity. This challenge can be probably managed by good training of the staff members about new technology and ensuring good facilities that help application.

INTRODUCTION

Teaching is one of the main objectives of universities, although occasionally this objective is disregarded in favor of research projects, which receive significantly more attention. However, because of their daily responsibilities, academic staff members are frequently exposed to many professional hazards, including voice problems, depression, and exhaustion.[1] To do research, write theses and dissertations, and remain up to date with advancements in their subjects, academic staff members need to have access to online resources that are significant to their studies. Lecturers may experience a marked rise in physical and psychological stress due to the amount of time they spend on the

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internet, computing, and compiling and organizing information. This might make it more difficult for them to do their jobs well.[2]

There is a risk of stress and psychological problems associated with teaching. The use of information and communication technologies (ICT) has an impact on academic staff members' working circumstances. Although, use of ICT has many advantages to users, it may negatively impact workers' satisfaction at work, productivity, and general well-being. Among these possible adverse consequences is technostress.[3]

Technostress is defined as a "modern disease caused by an inability to cope with new computer technologies in a healthy manner".[4] Technostress exhibits four traits; behavioral, psychological, emotional, and physical**.** [2] Technostress is usually manifested in the individual as strains: emotional exhaustion, work exhaustion, and anxiety and frustration. Techno-overload (too much), Techno-uncertainty (unfamiliar), Techno-invasion (always connected), and Techno-complexity (difficult) are the five variables that combine to form technostress.[5]

In addition to the behavioral strain caused by continuous ICT use, side effects of technostress include heart attacks, back pain, headache, high blood pressure, stomach problems, and impatience. Research suggests that these adverse outcomes have an impact on workers' job satisfaction, productivity, and sustained commitment.[6] These adverse outcomes can influence employees' job satisfaction, productivity, and sustained commitment.[7] As a result, Previous studies showed that older workers who had higher experience levels suffered more difficulties at work as a result of the increasing complexity of IT.[8]

Technostress prevalence among professionals and workers who use technology for work-related tasks ranges from lower value of 51% to quite high percentages of 97%. [9] Technostress has a negative impact on a person's mental and physical health. They get overworked and lose focus, which affects their performance. Academic members who experience technostress may experience burnout, reduced job satisfaction, and decreased productivity.[10]

The rationale behind this research was that a new industry had emerged because of technology use in classrooms. Today's academic staff predominantly uses technology for both teaching and research purposes because of its rapid advancement. Technology can improve transparency, reduce red tape, and enable distance learning.

Table 1: Socio-demographic characteristics of the studied staff members

	Staff members (N=403)	
	Number	%
Age (years)		
28-37	203	50.4
37.1-68	200	49.6
Mean±SD		35.5±8.2
Range		28-68
Gender:		
Male	92	22.8
Female	311	77.2
Residence:		
Urban	317	78.7
Rural	86	21.3
Faculty:		
Medicine	225	55.8
Veterinary	35	8.7
Science	40	9.9
Engineering	52	12.5
Education	19	4.7
Art	21	5.2
Nursing	11	2.7
Degree:		
Assistant lecturer	161	39.9
Lecturer	140	34.7
Associate professor	51	12.7
Professor	39	9.7
Professor Emeritus	12	3.0
Years spent on job:		
4-14	202	50.1
14.1-44	201	49.9

Although there are many benefits associated with technology, there has been long discussion about the potential disadvantages for users. Workers are going through a phenomenon called "technostress" Academic staff members are expected to manage many digital platforms, reply to emails and comments from students and colleagues, and keep up with technology changes. These demands can quickly lead to excessive workload and burnout. As a result, there may be a decrease in the commitment to teaching, emotional exhaustion, and job satisfaction. The objective of the current study was to assess the frequency of technostress among academic staff at Zagazig University and to study its effect on work.

Table 2: Technology support measures among the staff members.

	Staff members (N=403)	
	N	%
Having good Wi-Fi	386	95.8
Having modern computer	367	91.1
Received technology-related training	218	54.1
Daily hours spent on mobile phone		
2-4	219	54.3
4.1-8	184	45.7
Mean±SD		4.5 ±1.3
Range		2-8
Daily hours spent on computer		
0.5-4	256	63.5
4.1-8	147	36.5
Mean±SD		4.0±1.3
Range		0.5-8

METHODS

A Cross-sectional study was carried out.at different faculties in Zagazig University, Egypt during the period from Mars 2024 to end of June 2024. A verbal consent was obtained from the participants before the interview, and after they had been told of the study aim and nature. Inclusion criteria entailed academic staff at different faculties in Zagazig University using technology in their work-related tasks.

The included 7 faculties had 6066 staff members with their proportion allocation were: faculty of medicine; 225 (55.8%), faculty of veterinary medicine; 35 (8.7%), faculty of science; 40 (9.9%), faculty of Engineering; 52 (12.5%), faculty of Education; 19(4.7%), faculty of art; 21 (5.2%), and faculty of nursing; 11 (2.7%).

Sample size estimation was done by assuming that 54.2% of academic staff members at universities experienced technostress according to Okonoda al. [11] and total number of academic staff working at Zagazig University during 2024 is (8474), with 10% non-response, at 95% confidence level and using the open Epi software; the sample size was 403.

A multistage sample was used; we selected 7 faculties from all 22 Zagazig university faculties using simple random sampling technique method, then a representative sample was selected from each of the 7 faculties using simple random sample technique method taking into consideration proportion allocation

Data collection tools: A semi-structured questionnaire consisting of two parts was used including the following items: The1st part: sociodemographic characteristics; (age, gender, residence), work type, years spent on job, and job grade. It also contained technology-associated factors (training, having modern computers and good Wi-Fi), the average daily hours spent on mobile phones and on computers. The second part: a questionnaire containing variables for technostress creators, role stress, and productivity. It is a valid questionnaire proposed by Tarafdar et al. [12] On a 5-point Likert scale, the 37 items in this tool are graded from 1 (strongly disagree) to 5 (strongly agree). *Technostress creators* is 23 items with total 115 points. This included techno-complexity (5 items), techno- insecurity (5 items), techno-overload (5 items), techno-invasion (4 items), and techno- uncertainty (4items). Role stress is 10 items with total 50 points. This included role overload (5 items) and role conflict (5 items). Productivity is 4 items with total 20 points. The total score of the questionnaire is 185 points.

Validation of the tool: To assess the clarity and understanding of the questionnaire, a pilot study was carried out on (40 academic staff from Zagazig University) 10% of the sample size. No modifications were performed on the questionnaire and their results were included in the main study.

Statistical analysis: All statistical analysis of the data was carried out using SPSS 26.0[13] for Windows (SPSS Inc., Chicago, IL, USA). The qualitative data was expressed using absolute frequencies (number) and relative frequencies (percentage). The percentage of categorical variables was compared using the Chi-square test. T-test & ANOVA were used to detect association between two or more groups regarding quantitative variables. Pearson correlation was used. Stepwise linear regression was used to predict associated variables. Every test had two sides. P values less than or equal 0.05 were regarded as statistically significant (S), whereas those greater than 0.05 were regarded as statistically insignificant (NS).

Table 3: Relation between the productivity of the staff members and socio-demographic characteristics

Variables	Productivity*	Test of significance	P-value
Age (years):			
28-37	14.91± 4.50	2.031	**0.043***
37.1-68	15.75± 3.75		
Gender:			
Male	15.25± 3.56	0.545	0.586
Female	14.95±4.91		
Residence:			
Urban	15.35± 3.93	1.088	0.278
Rural	15.90± 4.92		
Faculty:			
Medicine	14.83± 3.99		
Veterinary medicine	14.60± 3.93		
Science	14.43± 4.06		
Engineering	15.13± 3.95	0.385	0.889
Education	15.89± 3.21		
Art	14.52± 5.05		
Nursing	14.45± 5.94		
Degree:			
Assistant lecturer	13.99± 5.05		
Lecturer	13.87± 3.48		**< 0.001***
Associate professor	17.06± 4.03	6.533	(P1= <0.001*)
Professor	14.77± 3.99		(P2= <0.001*)
Professor Emeritus	15.58± 2.57		
Years spent on job:			
4-14	14.10± 4.32	3.37	**< 0.001***
14.1-44	15.53± 4.03		

*P1 is the p-value between assistant lecturer and associate professor; P2 is the p-value between lecturer and associate professor; Productivity total is 20 **

RESULTS

As shown in table (1), this study included 403 university staff members who ranged from 28-68 years old and 50.4% of the participants were in the age group 28-37 years with mean age 35.5 years (±8.2) years. Females represented 77.2% of the participants but the majority lived in urban areas (78.7%). The participants were working in 7 faculties in Zagazig University while about 55.8% of them worked in faculty of medicine and 39.9% of them were assistant lecturers. They spent from 4 to 44 years in their jobs and almost 50.1% of them spent from 4-14 years.

Table (2) shows that, regarding technology support measures among the staff members, most of them had good access to Wi-Fi services (95.8%), 91.1% had modern computers and 54.1% received technology-related training. The participants spent from 2 to 8 hours using mobile phones every day, and about (54.3%) of them spent from 2 to 4 hours. Also, the participants spent from 0.5 to 8 hours using computers every day, and 63.5% of them spent from 0.5 to 4 hours.

Table (3) shows that, a significant statistical relationship was found between productivity of an employee and their age and years of work; we found that productivity score was significantly more among

Table 4: Relation between the productivity of the staff members and technology support measures

Variables	Productivity*	Test of significance	P-value
Having good Wi-Fi			
Yes	15.20± 3.72	9.38	< 0.001*
No	6.65± 2.57		
Having modern computer			
Yes	14.93± 3.82	1.55	0.122
No	13.83± 5.94		
Received technology-related training			
Yes	15.75± 4.45	2.26	0.025*
No	14.82± 3.73		
Daily hours spent on mobile phone			
2-4	16.1± 2.88	1.02	0.307
4.1-8	15.68± 4.90		
Daily hours spent on computer			
0.5-4	16.34± 2.93	1.759	0.079
4.1-8	15.6±4.59		

*Productivity total is 20 **

older age group (37.1 – 68) and among staff group spending more years on work (14.1-44), Furthermore, a statistically significant relationship was seen between the job grade and productivity where productivity score was significantly higher among associate professors than assistant lecturers and lecturers (P<0.001)

Table 5: Correlation between productivity among the staff members and technostress creators and role stressors

	Productivity r (P)
Techno-overload	0.246 (**< 0.001**)
Techno-invasion	0.409 **(< 0.001)**
Techno-complexity	- 0.151 **(0.002)**
Techno-insecurity	- 0.236 **(< 0.001)**
Techno-uncertainty	0.558 **(< 0.001)**
Role-overload	0.330 **(< 0.001)**
Role-conflict	- 0.246 **(< 0.001)**

As shown in table (4), a statistically significant association was discovered between technology-related training, having good Wi-Fi; and productivity; productivity was significantly higher among staff members who received technology-related training and those having good Wi-Fi.

Table (5) shows that there were significant negative correlations between techno-insecurity, techno-complexity, and role conflict with productivity. Whereas there was a significant positive correlation between techno-overload, techno-uncertainty, techno-invasion, role-overload, and productivity

As shown in table (6), techno-uncertainty, having good Wi-Fi, techno-invasion, job grade, age (years), years spent on job, techno-overload and techno-complexity are significantly independently associated with productivity.

DISCUSSION

There are several ways that information and communication technology (ICT) can help with teaching and learning in higher education. Technostress is a disease that is becoming more and more recognized because of how frequently information and communication technologies are utilized in both private and professional contexts. ICT has facilitated numerous work-related tasks, but it has also contributed to the rise of many psychiatric disorders, such as technostress Stress caused by technology is a psychophysiological disorder marked by elevated levels of hormones related to stress and cognitive symptoms such irritability, memory problems, and difficulties in focusing.[14]

The present study included 403 university staff members with statistically significant association

Table 6: Stepwise linear regression analysis of factors significantly associated with productivity among the staff members

	Unstandardized Coefficients		Standardized Coefficients	t	P	95% Confidence Interval	
	Beta	Std. Error	Beta			Lower	Upper
Techno-uncertainty	0.498	0.052	0.451	9.582	< 0.001	0.395	0.600
Having good Wi-Fi	5.021	0.846	0.243	5.932	< 0.001	3.357	6.685
Techno-invasion	0.288	0.054	0.279	5.344	< 0.001	0.182	0.394
Degree	2.116	0.368	0.686	5.754	< 0.001	1.393	2.839
Age (years)	2.282	0.554	0.275	4.120	< 0.001	-3.371	-1.193
Years spent on job	0.173	0.047	0.369	3.678	< 0.001	-0.266	-0.081
Techno-overload	0.143	0.053	0.138	2.695	0.007	-0.247	-0.039
Techno-complexity	0.097	0.042	0.092	2.287	0.023	0.014	0.180

between productivity and job grade. The participants with high years of experience had high productivity. In agreement with our findings, Ismail et al.[5] reported that the 44-58 age group showed higher productivity than the 29-43 age group. This could be explained by the higher experience and degree of the former group. That is also obvious in the results where the 19-32 years' experience group is statistically significantly higher in productivity than the 4-18 years' experience group. Also, the professors' group is statistically significantly higher in productivity than the assistant lecturers' group. Also, Tagurum et al.[15] revealed higher educated people reported that technology use had a major impact on their productivity which support our results.

This study revealed that most of them had good access to WIFI services (95.8%) and 54.1% received technology-related training. Productivity was shown to be strongly correlated with having dependable Wi-Fi. Furthermore, a statistically significant association was discovered between technological training and production which is in agreement with our results, study of Abdullahi, [16] as they showed that the productivity of academic staff members at Kano State Polytechnic in Nigeria is greatly and favorably impacted by the training method, design, and delivery style. Similar results were obtained by Ezeani[17] and Ismail et al.[5], as they stated that work productivity was significantly correlated with training.

The accomplishments of employees or their basic efficacy at work are referred to as workers' productivity. Efficiency and productivity are primarily accomplished at the organizational, process, and person levels in an organization. The ways in which these levels interact create the organization's perspective. Training and development procedures are put into place in order to support the organization's overarching objective since they are advantageous to both the organization and the individuals that comprise it.[18] In contrary to our results, study of Li & Wang,[19] as they reported that the provision of technological help has a negligible impact on improving university instructors' productivity. The qualities of the support workers can be to blame. Because some technical support employees are impatient and condescending, and because they don't want to be given instructions, some professors choose not to work with them.

In the study in our hands, technological insecurity and complexity has a strong negative correlation with production. However, there was a clear positive correlation between productivity and invasion, uncertainty, and technology overload. Our results were in accordance with the study of Ismail et al. [5], as they stated compared to techno-uncertainty, production was adversely correlated with techno-complexity and techno-insecurity. Also, Li & Wang, [19] demonstrated that the variability and complexity of technology seriously impairs their productivity.

Nonetheless, a positive association was shown between their level of productivity at work and a particular type of technostress known as techno-overload. The most crucial factor in preventing the development of technostress producers and enhancing university instructors' job performance was thought to be the facilitation of collaboration among the three technostress inhibitors. This result supported earlier research [20 & 21] demonstrated teachers' technostress may be lessened by their involvement in and participation with decision-making during significant initiatives like ICT implementation. This is due to the possibility that, by considering the needs and preferences of university instructors, ICT installations may better tailor the tool to their work by acquainting them with it from the start. Teachers who actively participate in the implementation process have a bigger voice in what ICT is created, used, and improved. Additionally, providing university instructors with up-to-date information on the potential advantages and disadvantages of ICT use related to their employment is mandatory.

In contrary to our results, the study of Hung et al.[22] showed a rise in productivity was attributed to individuals' overuse of technology. This might be the outcome of finding a balance between the benefits of ICT and the tension that comes with using it. Even though university instructors produce an incredible number of ICT features, apps, and material, this abundance also makes their jobs easier and more efficient. On the other hand, one should avoid becoming over technologically competent. People's productivity at work could suffer from excessive overload due to overuse of ICT. However, Kim & Lee [23] claimed that self-efficacy and technical support, through their interactions with overload, insecurity, and uncertainty, mitigate technological stress and counterproductive work behavior. On the other hand, counterproductive work practices and aversion to innovation are positively impacted by technological invasion, overload, instability, and uncertainty. These consist of actions that lower productivity, include acting strangely while at work, squandering time and resources, acting harshly toward coworkers, and acting disrespectfully at work.

Regarding the association between role overload and productivity, there were significant negative correlations between role conflict with productivity and a significant positive correlation between role-overload and productivity. Our results agreed with study of Amie-Ogan & Fekarurhobo, [24] as they reported writing post-graduate theses for academic staff at Rivers State institutions, overseeing a large number of undergraduate projects, and teaching many courses in a semester all have an impact on high job performance. Also, Richard**,** [25] noted that lecturers in most universities in Nigeria are made to teach up to five, six or more courses per week in the various programs offered in the school (pre-degree, regular, part time, post-graduate and sandwich). Consequently, most lecturers in Nigerian universities reported high stress levels interfering with their wellness, sleep and the quality of work. Similar results reported by [5, 26] and [27] as they stated that there was a significant inverse relationship between role conflict and productivity. However, in the study of Kumar et al. [28,] it has been found that role overload did not significantly affect job performance workload because of the good working environment.

In our results, stepwise liner regression model for productivity among staff members demonstrates that techno-uncertainty, having good Wi-Fi, techno-invasion, job grade, age (years), years spent on job, techno-overload and techno-complexity are significantly independently associated with productivity. Our results agreed with the study of Ismail et al.,[5] as they revealed that techno-uncertainty was a statistically significant predictor for productivity.

The results of this study might have an influence on management of higher education institutions. First, technical instability and complexity were the main causes of technological stress, which negatively affected university instructors' capacity to perform their duties. Thus, administrators and legislators responsible for ICT implementation may specifically consider (a) streamlining the process of integrating ICT into university teachers' work and (b) promptly informing them of any changes or difficulties that may arise in their jobs because of ICT implementation in order to lessen university teachers' feelings of insecurity. Second, our research indicates that strategies for promoting literacy, including as end-user training, professional development courses, and workshops, may actually exacerbate technostress rather than reduce it. The effectiveness of literacy facilitation is critical in this case. Therefore, in order to improve professors' knowledge and proficiency in

using ICT for their work, it is ideal if university-run literacy facilitation programs are customized to each professor's needs and take into account their time and effort limits. If not, attempts to promote literacy could ultimately result in university instructors being even more anxious about technology.

***Study limitations*:** Because of the cross-sectional nature of this study, it is challenging to determine the causal links between technostressors and job performance. We also can't cover all job grades because of lack of cooperation of some members. A longitudinal design may be taken into consideration in future studies to examine potential causal links between these constructs. Secondly, taking into account the paucity of research on technostress and productivity in higher education. To obtain a deeper knowledge of the problem of technostress, future research might be carried out in universities from other contexts and cultures to validate these findings.

CONCLUSIONS

Many factors influence university staff members' productivity. Technostress is one of the significant yet underappreciated aspects. It is necessary for academic staff and organizations to be aware of its causes, symptoms, and repercussions. Techno-uncertainty, having good Wi-Fi, techno-invasion, degree, age (years), years spent on job, techno-overload and techno-complexity are significantly independently associated with productivity.

Ethics Approval

The study obtained all required approvals from the Institutional Review Board of Zagazig University (IRP#164/24-March -2024) The participants were informed of the study's purpose. Participants' information was kept confidential.

***Funding source*:** The authors received no financial support related to this research

***Conflict of interest*:** All authors have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

***Author contributions*:** Nesma Abdallah Mahmoud: research methodology, data collection, data analysis, paper writing. Eman Mohamed Abd el-Sattar: literature search, data collection and paper writing. Mona Fathy Ali Zaitoun: data collection, paper writing and critical review

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Cite this article as: Mahmoud, N.A. et al. Technostress and its Effect on Work Productivity among Academic Staff Members at Zagazig University. *Egyptian Journal of Community Medicine*, 2025;43(1):64-72.

DOI: 10.21608/ejcm.2024.309474.1313