

Moderating effect of digital safety on employees' adaptive performance in a virtual working environment

Norfadzilah Abdul Razak^{a*}

^a*Faculty of Business and Management, Universiti Teknologi MARA, Puncak Alam, Selangor, Malaysia*

ARTICLE INFO

Article history:

Received 23 October 2025

Accepted 15 December 2025

Published 31 January 2026

Keywords:

Adaptive Performance

Digital Skill

Digital Safety

Virtual Work

DOI:

10.24191/jeeir.v14i1.8699

ABSTRACT

Changes in the virtual working environment have raised attention of the importance and advantages of employees in the education sector. The start of virtual working environment has begun following the impact of the COVID-19 pandemic on workplaces. Academics and non-academics have adopted virtual work practice to mitigate adverse effects on their employees' health and performance. This change enables them to adapt to virtual work, and this new norm has opened up the landscape for employees to perform tasks effectively. This study examines the relationship between work practices, organizational dynamics, and technology on adaptive performance which encompasses learning capabilities and problem-solving skills with digital safety serving as a moderating factor among academic and non-academic staff at several selected local universities in Malaysia. A survey and a structural equation model, using SmartPLS were applied to test the hypotheses. The results revealed that organizational dynamic factors had no significant influence on learning capabilities and problem-solving skills. In contrast, work practices had a significant influence on problem-solving, but this finding contradicted the results on learning, as work practices also had no significant influence on learning. Meanwhile, the technology had a significant influence on learning capabilities and problem-solving skills. This study suggests that the use of technology in virtual workspaces provides evidence to enhance employees' adaptive performance, thereby sustaining the effectiveness of high-performance work practices (HPWPs).

1. Introduction

There has been a noticeable shift in how people work over the past few years, and virtual work trends have been a significant contributing factor to this change. The growing demand for flexibility among employees, coupled with the COVID-19 pandemic, has led to a surge in the popularity of remote work. In fact, following the COVID-19 outbreak, 67% of Malaysian employers mandated that their employees work from home, according to Jobstreet's Malaysia Survey Report (Moffitt, 2024). Embracing a virtual work environment offers numerous advantages for both businesses and employees. These advantages for virtual workers include higher output, lower expenses, and better mental health. Research indicates that employees working remotely experience a 22% increase in productivity compared to those working in-person, as they encounter fewer disruptions and have a more favourable work-life balance (Moffitt, 2024). Adopting remote

* Corresponding author. E-mail address: norfadzilah0438@uitm.edu.my

work arrangements can save firms an estimated \$11,000 per year per employee, primarily through lower office space expenditures. Conversely, employees might save anywhere from \$2,500 to \$4,000 annually because of lower office-related and transportation costs. Moffitt (2024) adds that working remotely has a positive impact on mental health, with 75% of remote workers reporting a better work-life balance and lower stress levels.

Adaptive performance has become increasingly essential in today's workplace, characterized by dynamic settings, rapidly evolving technology, and a rapid pace of change. It is valuable for evaluating how well employees have adapted to their new work environment. It entails not only having the ability to adapt, but also demonstrating this skill through real-world work performance (Loughlin & Priyadarshini, 2021). Flexibility and adaptability to various technologies, communication styles, and workflows are fundamental requirements for virtual work. Employees regularly encounter and overcome new challenges in this environment, fostering adaptive performance. They frequently use online tools such as Zoom, Microsoft Teams, and Google Meet. In a study, Hamid (2023) mentions that switching between these tools and adjusting to their features necessitates quick adaptation to new technologies and processes, enhancing adaptive performance.

While communication technology facilitates task management in virtual teams, difficulties arise when team members collaborate. Zahar et al.'s (2021) finding proves that many Malaysian professionals who worked from home during the COVID-19 epidemic reported feeling uncomfortable and under more stress. The absence of in-person interactions in remote work can erode team members' trust and, if not addressed appropriately, lead to feelings of disconnection and isolation. As such, properly managing communication channels in a virtual workplace requires employees to execute highly adaptable skills (Zahar et al., 2021). Modern Malaysian organization dynamics are increasingly shifting towards virtual workspaces due to evolving work patterns and technological advancements. This shift will have a significant impact on employee performance, particularly in areas such as learning and problem-solving. Nonetheless, it is impossible to exaggerate the significance of digital safety in a remote workplace. Businesses and governments are working harder than ever to digitize operations and services, embracing automation, artificial intelligence, cloud computing, and other technologies. However, this comes with new risks, including social engineering, phishing, and an increase in cybercrime. It also raises concerns about data security, whether digital or traditional as mentioned by Khan and Charan (2023). Therefore, this study aims to investigate the relationship between work practices, organizational dynamics, and technology in enhancing learning capabilities and problem-solving skills, with a focus on the moderating effect of digital safety among academic and non-academic staff in a selected local university.

2. Literature review

The transition to virtual work has significantly altered the functioning of organizational dynamics and the way employees complete their work tasks (Vuchkovski et al., 2023). Despite the many advantages of virtual work, including increased mobility and comfort, it poses a significant threat to efficient and practical work, as well as timely adaptation to change and the adoption of new technology (Ferreira et al., 2021). A critical issue contributing to these challenges is the mental condition of employees working in virtual environments. AlAbri et al. (2022) find that poor work practices within organizational dynamics have been linked to negative adaptive performance, including reduced ability to solve problems creatively and to learn new work tasks, technologies, and procedures. This decline in adaptive performance often leads to poor work-life balance, a common issue in virtual work environments (Waworuntu et al., 2022). In Malaysia, this issue is particularly pronounced, with many employees experiencing increased levels of anxiety and depression due to work-from-home arrangements (HRM Asia, 2024). Implementing robust digital safety measures could mitigate the impact of poor work practices on adaptive performance by providing a safer and more supportive virtual work environment. However, a practical gap remains in addressing how digital safety initiatives can improve technology and learning capability, thereby reducing the mental health issues experienced by virtual work employees in Malaysia (Abiddin et al., 2022). As shown in Figure 1, the factors of organizational dynamics, work practices, and technology were independent variables, while the two

dependent variables are problem-solving skills and learning capabilities. The moderating variable, digital safety, was tested only in relation to the relationship between technology and learning capability. From Figure 1, there were seven hypotheses tested as follows;

2.1 *Underpinning theory of adaptive performance*

The leading theory in this study is Kurt Lewin's Change Theory (Lewin, 1947), which explains the process of change in the workplace. Organisational change refers to the movement of an organisation from the known to the unknown, which is the outcome of these changes. This is because the future of this change is uncertain and may concern people's worth, coping abilities, and competency. Therefore, the members of organisation do not support change unless they are convinced that it is better than the status quo. In this context, the transition from the traditional office to virtual work is a process for the organisation and its employees as they move towards a new working environment. Apart from that, the Change Theory explains the fundamentals of change for before, during, and after change. Specifically, the Change Theory is related to the transformation of traditional workspaces to virtual work (Halmen et al., 2024). The model suggests that individuals' behaviour is influenced by the interaction between their characteristics and the environment in which they operate. The theory asserts that personal and environmental influences primarily influence individual behaviour. This study employed this model technique to establish a foundational knowledge of virtual work adoption, a behaviour that has garnered minimal scholarly attention. In virtual work, Aminuddin et al. (2025) claims that this theory emphasizes that organizations can positively influence employee behavior by creating a supportive and conducive virtual working environment. Thus, organisations must provide the tools and resources for virtual teams to communicate and collaborate effectively.

In addition to providing the necessary technology, organisations should also focus on fostering a sense of trust and camaraderie among virtual team members (Digap & Quines, 2022). This can be achieved through work practices, organizational dynamics, and technology, enhancing adaptive performance by emphasizing problem-solving skills and learning capabilities. Ali et al. (2020) stress that by doing so, organisations can help employees feel more connected and engaged, ultimately leading to higher productivity and satisfaction. Various factors drive the transformation of traditional workplaces to virtual workplaces. Organisations increasingly offer virtual work arrangements to achieve strategic goals (Raghuram et al., 2019). These goals include creating a work-life balance for employees, reducing real estate costs, and attracting as well as retaining high-quality adaptive performance. By allowing employees to work remotely, organisations can reduce the need for physical office space and associated costs (Vinueza-Cabezas et al., 2022).

2.2 *Work practices and problem-solving skills*

Research has shown that effective work practices in a virtual working environment are vital for maintaining productivity and engagement. Moffit (2024) suggests that structured workflows, regular check-ins, and clear communication protocols help employees stay organized and focused as individuals, which in turn enhances their self-efficacy and problem-solving skills. Furthermore, Adamovic et al. (2021) found that virtual workers who can independently organize their tasks, structure their work, and set clear objectives are better equipped to handle challenges associated with virtual work, such as conflict, social isolation, and lack of teamwork. Thus, hypothesis 1 was formulated as follows:

Hypothesis 1: Work practice positively influences problem-solving skills.

2.3 *Organization dynamics and problem-solving skills*

Hamid (2023) emphasizes that enhancing employees' adaptive performance and problem-solving skills in virtual environments necessitates an organizational dynamic that includes providing employees with the

necessary resources, training, and emotional support on an individual basis. Similarly, Adamovic et al. (2021) claim that companies need to create an environment favourable for virtual work by implementing efficient communication strategies to increase employee engagement, ensuring managers. This will ensure that coworkers are supportive, and helping virtual workers advance their careers. All of these elements work together to create a favorable workplace atmosphere, which improves workers' ability to solve problems and their impression of how helpful the virtual work environment is. Hence, hypothesis 2 was developed as follows:

Hypothesis 2: Organizational dynamics positively influence problem-solving skills.

2.4 Technology and solving problems

According to Hamid (2023), technology plays a crucial role in virtual work environments by facilitating effective communication, teamwork, and information accessibility, all of which expedite problem-solving skills. This is supported when Zahar et al. (2021) suggest that virtual teams are better equipped to manage tasks and find rapid and efficient solutions to problems due to the use of new communication tools. Cutting-edge digital technologies are essential for enhancing the problem-solving skills of virtual workers, as they facilitate easier information sharing and decision-making. Furthermore, Adamovic et al. (2021) argue that providing employees with technology training and proper technical resources is crucial for enhancing team efficiency in work-related activities and resolving problems. Hence, hypothesis 3 was developed as follows:

Hypothesis 3: Technology positively influences problem-solving skills.

2.5 Work practices and learning capabilities

Work practice and learning are highly interactive and contextually associated with the concept of adaptive performance in a virtual working environment. In this setting, work practices are defined by employees' routines, behaviors, and interactions, which continuously evolve as individuals and learning capabilities adapt to remote or hybrid work models (Derrick et al., 2022). Connor et al. (2021) indicate that, especially during the COVID-19 pandemic, the link between work practices and learning was further established, as shifting to an online and remote learning environment requires new strategies and the use of technology. Thus, effective work practices align with learning capabilities goals and contribute to a rich learning process for employees. This helps them to develop skills and knowledge that set them on the path to future workplace success. Pretti et al. (2020) further support that effective work practices play a crucial role in supporting organizational dynamic objectives and fostering a comprehensive learning experience in a virtual work environment. Hence, hypothesis 4 was developed as follows:

Hypothesis 4: Work practices positively influence learning capabilities.

2.6 Organization dynamics and learning capabilities

In a virtual work environment, the role of an organization's dynamics and learning can be examined more in terms of adaptive performance. Organization dynamic with a learning orientation promotes employees' learning processes and the application of new knowledge (Alerasoul et al., 2022). This is especially important when new technologies, remote communication, and changing workflow patterns are introduced rapidly. Argote et al. (2021) posit that organizational dynamics involve transforming knowledge gained at the individual level into practices that form organizational dynamic habits that may foster innovation or make the organization more dynamic, efficient, and responsive to its environment.

As a result, organization dynamics that invest in learning and knowledge management establish a strong and more adaptable workforce to address existing and emerging issues (Moşteanu, 2024). Hence, hypothesis 5 was developed as follows:

Hypothesis 5: Organizational dynamics positively influence learning capabilities.

2.7 Technology and learning capabilities

According to Karl et al. (2021), technology, particularly videoconferencing tools, plays a crucial role in facilitating communication and learning capabilities by providing features such as polling, chat functions, and video features. These tools enable participants to engage more interactively, share insights, and gain a deeper understanding of their employees' personal lives, thereby enhancing relationships and team cohesion. Lindstrom et al. (2021) further support that technology is a crucial enabler of learning by providing diverse platforms and tools tailored to different educational needs. This adaptability is crucial in creating an environment that supports continuous professional development, skill acquisition, and collaboration, regardless of geographical boundaries for employees (Whillans et al., 2021). Hence, hypothesis 6 was developed as follows:

Hypothesis 6: Technology has a positive influence on learning capabilities.

2.8 Digital safety moderate technology and learning capabilities

While using technology for learning purposes, users must be educated to learn in a safe environment (Spiteri & Rundgren, 2020). For example, talks could be organized to educate users about related policies and boundaries, thereby preventing negative learning experiences (Spiteri & Rundgren, 2020). The authors also state that users should utilize technologies such as online learning platforms, the internet, or mobile phones to share their work and gather feedback, allowing other users to learn from their experiences. Furthermore, Khan and Charan (2023) also emphasize that employees should be provided with a safe digital environment when using learning technologies to promote an exceptional learning experience. Thus, the research above indicates that there is likely a relationship between digital safety, technology, and learning. Hence, hypothesis 7 was developed as follows:

Hypothesis 7: Digital safety moderates the relationship between technology and organizational dynamic learning.

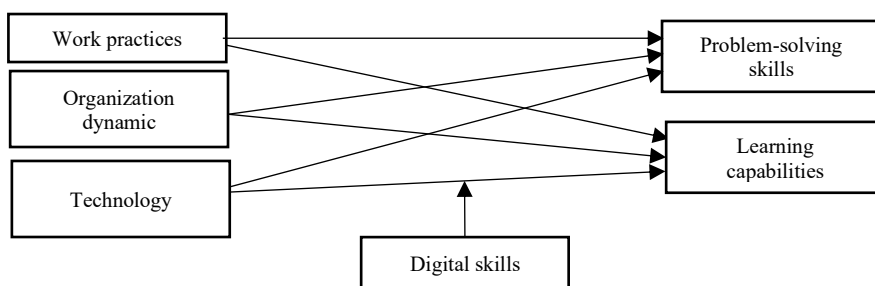


Figure 1. Research framework

3. Methodology

This research employed a quantitative methodology that encompasses a set of approaches to investigate social, psychological, and economic processes through numerical data analysis (Ahmad et al., 2019). Adding to that, Ahmad et al. (2019) mention that researchers can divide the data into groups by conducting

statistical analysis on quantitative information. Furthermore, some methodologies include structured observations, questionnaires, and experiments (Ahmad et al., 2019). A structural equation model is employed to analyze the data and test hypotheses using Smart PLS, encompassing both measurement and structural models. The study focused on employees in the higher education sector in Malaysia, utilizing purposive sampling to gather data from 234 respondents.

3.1 Measure

The items in Table 1 showed the measurement items for solving problems and learning was adapted from Pulakos et al. (2000), and there are four items from adaptive performance, which consist of two dimensions: problem-solving skills and learning capability. Meanwhile, the work practices, organizational dynamics, and technology were adapted from Chudoba et al. (2005), and digital safety was validated by Wang (2025). Overall, all items used a five-point Likert scale, with one indicating "strongly disagree" and five indicating "strongly agree."

Table 1: Item measurement

Indicator	Items	Sources
<i>Problem solving skills</i>		
PS1	I use virtual working to find innovative ways to deal with complex tasks.	Pulakos et al. (2000)
PS2	I use virtual working to find creative ideas to manage difficult tasks.	
PS3	I will use virtual working for collaborative tasks in my workplace in the future.	
PS4	I use virtual working for collaborative tasks in my workplace.	
PS5	I recommend that others in my workplace use virtual work for collaborative tasks.	
PS6	I foresee using virtual working for collaborations and information sharing.	
<i>Learning capabilities</i>		
LC1	New experiences are learning opportunities for me.	Pulakos et al. (2000)
LC2	I easily retain new information	
LC3	I'm optimistic that I can learn new information.	
LC4	I enjoy researching new information.	
LC5	I look for ways to use new knowledge.	
<i>Organization dynamic</i>		
OD1	My organisation provides the equipment and materials necessary to work outside the office (e.g., computer, teleconferencing equipment, software, etc.).	Hodzic et al. (2021)
OD2	My organisation provides adequate training to use telecommunications technology (teleconferencing, e-mail, etc.) to work outside the office.	
OD3	My organisation provides the technical support necessary to help employees work outside the office (e.g., helpline, dispatched technicians, etc.).	
OD4	My supervisor is sensitive to employees' preferences about virtual work.	
OD5	My supervisor is sympathetic toward employees' desires and needs to work virtually.	
OD6	My supervisor recognises and appreciates good work that is performed virtually.	
<i>Digital safety</i>		
DS1	I am careful and try to ensure that my messages do not irritate others.	Wang (2025)
DS2	I am careful with my personal information.	
DS3	I am careful with the information of other people.	
DS4	I avoid having arguments with others in digital environments.	
DS5	I avoid having arguments with others in digital environments.	
DS6	I can identify harmful behavior that can affect me on social networks.	
DS7	I avoid behaviors that are harmful on social networks.	
DS8	When sharing digital information, I can protect my privacy and security.	
DS9	Before doing a digital activity (e.g., uploading a photo, or comment ...), I think about the possible	

Indicator	Items	Sources
<i>Technology</i>		
TEC1	I can work with people via Internet-based conferencing applications.	Chudoba et al. (2005)
TEC2	I can participate in real-time online discussions, such as chat or instant messaging.	
TEC3	I can meet with people via video-conferencing tools.	
TEC4	I can work with mobile devices.	
TEC5	With virtual working, I would accomplish collaboration tasks more quickly.	
TEC6	Virtual work for collaboration tasks would enhance my effectiveness.	
TEC7	Virtual work would make it easier for me to carry out collaboration tasks.	
TEC8	Overall, virtual work is helpful for collaboration tasks.	
<i>Work Practice</i>		
WP1	I can work on projects with changing team members during virtual work.	Chudoba et al. (2005)
WP2	I can work with teams with different ways to track their work.	
WP3	I can work with people that use different collaboration technologies and tools.	
WP4	Most of my peers continuously encourage each other to work virtually.	
WP5	Most of my peers explicitly support virtual work.	
WP6	Most of my peers genuinely believe in the benefits of virtual work.	

3.2 Data collection procedure

The population of this study involved academic and non-academic employees in selected local universities in Malaysia. A purposive sampling technique was employed to collect data from employees with extensive experience in virtual work. In order to encourage more participants for an online survey this study employed a snowballing approach to select the appropriate sample group and collect more respondents for this study.

4. Findings and discussion

In this finding, the results of the structural equation model comprise both a measurement model and a structural model, which were analyzed using SmartPLS4. The study focused on employees in the higher education sector in Malaysia which utilized purposive sampling to gather data from 234 respondents. The respondents were 150 females and 84 males, indicating that the majority of respondents were female employees. There was an equal number of respondents from both academic and non-academic employees in the selected local universities in Selangor. Adding to it, the employees were predominantly aged between 31 and 40 years old, with a total of 68 respondents, followed by 63 respondents aged 41 to 50 years old, and 52 respondents aged 50 years and above. A total of 100 respondents had 6 years or more of work experience, followed by 94 respondents with 4 to 6 years of work experience, and only 40 respondents had 1 to 4 years of work experience.

Table 2: Demographic factor analysis

Demographic factor	Frequency	Percentage	Demographic factor	Frequency	Percentage
Gender			Working experience		
Female	150	64.10	1-3 years	40	17.09
Male	84	35.90	4-6 years	94	40.17
			6 years and above	100	42.74
Academic	117	50.0	Have you experienced virtual work?		
Non-academic	117	50.0	Yes	234	100.0
			No	0	0.00
Age					
20-30 years old	51	21.79			
31-40 years old	68	29.06			
41-50 years old	63	26.92			
50 years old and above	52	22.23			

4.1 Measurement model

Table 3 below tabulates the results for the construct reliability and validity test. In terms of composite reliability, all the constructs have values ranging from 0.917 to 0.971, specifically learning capabilities (CR = 0.971), organization dynamic (CR = 0.936), safety (CR = 0.943), problem-solving skills (CR = 0.945), technology (CR = 0.961), and work practice (CR = 0.917). Furthermore, all constructs have an average variance extracted (AVE) value ranging from 0.648 to 0.828, specifically learning capabilities (AVE = 0.828), organization dynamic (AVE = 0.711), digital safety (AVE = 0.649), problem-solving skills (AVE = 0.743), technology (AVE = 0.758), and work practice (AVE = 0.648). Overall, all the constructs have reached the threshold values recommended by Ab Hamid et al. (2017), which is greater than 0.7 for the composite reliability value (CR) and greater than 0.5 for the average variance extracted (AVE). The results in Table 1 demonstrate that the constructs were highly reliable and internally consistent, and all constructs and items applied to this study.

Table 3. Convergent validity

Constructs	Loading	CR	AVE	Constructs	Loading	CR	AVE
Learning capabilities		0.971	0.828	Problem-solving skills		0.945	0.743
LC1	0.933			PS1	0.808		
LC2	0.858			PS2	0.842		
LC3	0.846			PS3	0.893		
LC4	0.947			PS4	0.872		
LC5	0.925			PS5	0.881		
LC6	0.912			PS6	0.872		
LC7	0.942						
Organization dynamic		0.936	0.711	Technology		0.961	0.758
OD1	0.833			TEC1	0.880		
OD2	0.834			TEC2	0.928		
OD3	0.856			TEC3	0.878		
OD4	0.866			TEC4	0.706		
OD5	0.848			TEC5	0.830		
OD6	0.820			TEC6	0.905		
				TEC7	0.878		
				TEC8	0.937		
Digital safety		0.943	0.649	Work Practice		0.917	0.648
DS1	0.735			WP1	0.721		
DS2	0.877			WP2	0.779		
DS3	0.844			WP3	0.800		
DS4	0.763			WP4	0.799		
DS5	0.864			WP5	0.887		
DS6	0.883			WP6	0.835		
DS7	0.772						
DS8	0.724						
DS9	0.719						

As shown in Table 4, the discriminant validity test using the heterotrait-monotrait ratio (HTMT) analysis determines whether the constructs are redundant and whether all items are relevant to this model. The discriminant validity is indicated to be less than 0.85 (Kline, 2011). In addition to problem-solving and learning ability, the findings were all less than 0.85; thus, the discriminant validity is established, and these variables are unlikely to measure the same thing. Since learning, problem-solving skill, and technology are conceptually similar constructs, their values fall within the acceptable range of 0.85 to 0.9, as noted by Hair et al. (2019). Hence, these variables are maintained without any items being removed from their constructs. All of the respondents had experience with virtual work.

Table 4: Discriminant validity assessment

Constructs	1	2	3	4	5	6
1. Learning capability						
2. Organization dynamics	0.771					
3. Digital safety	0.753	0.676				
4. Problem-solving skills	0.898	0.730	0.661			
5. Technology	0.887	0.788	0.751	0.838		
6. Work Practice	0.798	0.808	0.624	0.843	0.832	

4.2 Structural model

Before moderation, the R-square values shown in Table 3 indicate that the R-square values for the dependent variables are 0.716 and 0.767 for problem-solving skills and learning capabilities, respectively. The adjusted R-square of problem-solving skills is 0.704, while the adjusted R-square of learning capability is 0.757. A safety variable is being introduced into the model as a moderating variable that influences the effect of technology on learning capabilities. When digital safety acts as the moderator, the R-squared value increases from 0.767 to 0.788. In other words, 78.8% of learning is explained by work practice, organization dynamics, and technology, with safety moderating the relationship between technology and learning. Therefore, this study demonstrates that safety has a moderating effect on the variables. As shown in Table 4, the results for organization dynamics, technology, and work practices are presented in relation to two dependent variables. The organization dynamic ($\beta = 0.075$, $t\text{-value} = 0.719$, $p\text{-value} > 0.05$) and work practice ($\beta = 0.138$, $t\text{-value} = 1.403$, $p\text{-value} > 0.05$) were not significant predictors of learning, as the t -values of the independent variables were greater than 1.96 at a significance value of 0.05. Therefore, Hypothesis 1 and Hypothesis 2 were not supported.

4.3 Moderation assessment

The moderation analysis follows the exact requirements, where the t -values should be greater than 1.96 (i.e., >1.96), and the p -values should not be less than 0.05 (i.e., <0.05). Based on the relationship, it is proven that digital safety and learning capability have a weak (beta value 0.224, which is less than 0.3), positive (beta value 0.224), and significant ($p\text{-value}$ of 0.041, which is less than 0.05). However, the interaction of the moderating effect changes the relationship to a weak (0.089) and insignificant ($t\text{-statistic} < 1.96$; $p\text{-value} > 0.05$) one between technology and learning capability. Hence, it is concluded that digital safety does not moderate the effect of technology on learning capability.

Table 4. Structural model assessment

Hypothesis	Relationship	β	STDEV	t	p
H1	Work practice $\rightarrow$ Learning capabilities	0.138	0.098	1.403	0.161
H2	Organization dynamic $\rightarrow$ Learning capabilities	0.075	0.105	0.719	0.472
H3	Technology $\rightarrow$ Learning capabilities	0.567	0.120	4.728	0.000
H4	Work Practice $\rightarrow$ Problem-solving skills	0.368	0.122	3.014	0.003
H5	Organization dynamic $\rightarrow$ Problem-solving skills	0.044	0.120	0.368	0.713
H6	Technology $\rightarrow$ Problem-solving skills	0.492	0.138	3.571	0.000
H7	Digital Safety x Technology $\rightarrow$ Learning capabilities	0.089	0.063	1.411	0.158

5. Discussion and conclusion

5.1 Discussion

The objective of this study is to investigate the relationship between work practices, organizational dynamics, and technology in enhancing learning capabilities and problem-solving skills, with a focus on the moderating effect of digital safety among academic and non-academic staff in a selected local university. The findings found that technology has a positive influence on learning capabilities, while work practices and technology have a positive influence on problem-solving skills. The H3, H4, and H6 were supported. The possibility that this happened due to the integration of technology, which encourages a virtual workspace, can enhance employees' problem-solving skills and learning capabilities. Software and tools, such as video conferencing, collaboration platforms, and AI integration, enable employees to perform more efficiently through innovative discussions and brainstorming sessions. Additionally, work practices in a virtual setting could enhance problem-solving. An adaptive and inclusive work culture enables and empowers employees to share their thoughts more regularly and conveniently. It will be critical for organization dynamics to encourage flexible work schedules, remote training programs, and self-monitoring work to improve the workforce's adaptive performance.

5.2 Implication on theoretical

The study's findings indicate that the adaptation of virtual work is facilitated by assessing the learning capabilities and problem-solving skills of employees which relate to the Change Theory. The model consistently implies these findings, as individuals' behavior is influenced by the interaction between their characteristics and the environment in which they work (Halmen et al., 2024). As in this study, the additional finding on the third change phase involves evaluating employees' adaptive performance in response to virtual work changes in the workplace (Amran et al., 2022). The employee's adaptive performance reflects the outcomes of the changes to demonstrate the effectiveness of the factors that caused them. Changes in the workplace can lead to either positive outcomes, such as increased productivity and employee satisfaction, or adverse outcomes, including increased stress and decreased morale. One significant change in the modern workplace is the shift towards knowledge-based work, which offers increased responsibility, better compensation, and higher learning opportunities (Aminuddin et al., 2025). However, this shift also introduces challenges, including fast-paced work, continuous demand for learning and using newer technologies, and reduced interpersonal interactions (Aminuddin et al., 2025). Moreover, Ojanperä et al. (2018) note that the changing nature and organization of jobs, along with the adoption of new technologies, can lead to both challenges, such as rising inequality and job losses, as well as new opportunities. It includes the creation of employment in both technology-driven and traditional sectors. However, in this situation, the employees' adaptive performance promotes virtual work practices.

5.3 Practical contributions

The study has provided several managerial implications for employers and businesses. Firstly, the use of technology in a virtual workspace is evidenced to improve the adaptive performance of workers (Alejandro et al., 2023). Businesses should ensure that their technology is well-supported and regularly updated, allowing employees to solve problems and perform their tasks more efficiently. Training, workshops, or town halls can be promising avenues to promote virtual workspaces and technologies, instilling the values of working virtually so that employees, the entire business, and the organization's dynamic can appreciate the benefits of working outside the office. Furthermore, employers should focus on creating a conducive work environment that encourages open discussion and collaboration among team members. This can be achieved through a collaborative virtual workspace, allowing employees to manage, brainstorm, modify, and track work tasks to generate effective solutions while adding value to clients.

5.4 Limitations and future research recommendations

Based on the study's findings, the following recommendations aim to enhance employees' problem-solving skills and learning capabilities through effective work practices and techniques. Firstly, organizations should invest in advanced technological tools that facilitate virtual workspaces. Tools such as video conferencing, collaboration platforms, and AI integration can significantly improve employees' problem-solving skills and learning capacities by promoting innovative discussions and brainstorming sessions. It is essential for these tools and software to have a user-friendly interface, minimizing learning curves and maximizing productivity. Secondly, organizations should encourage flexible work schedules that accommodate employees' personal and professional needs. This flexibility can lead to improved job satisfaction and productivity. Employees should be empowered to self-monitor their work, enabling them to manage and schedule tasks effectively. Furthermore, establishing regular communication channels enables employees to share their thoughts and ideas effectively (Alzahrani et al., 2023). This can be achieved through virtual town halls, regular team meetings, and open forums. Organizations should also create a collaborative environment where employees feel comfortable sharing ideas and solutions. Additionally, mechanisms should be implemented to collect feedback from employees regarding the effectiveness of virtual workspaces, adaptive work practices, and technological tools. This feedback can offer valuable insights into areas that require improvement. Developing performance metrics to measure the effectiveness of these recommendations can be a valuable tool for evaluating their impact. These metrics can help inform data-driven decisions for further enhancements. By implementing these recommendations, organizations can create a more adaptive and inclusive work environment that enhances employees' problem-solving and learning capabilities.

Acknowledgements

The authors would like to acknowledge the support of the Institute of Business Excellence, Universiti Teknologi Mara (UiTM), Shah Alam, Selangor, Malaysia, for providing the facilities and financial support for this research.

Conflict of interest statement

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts, and declare the absence of conflicting interests with the funders.

References

- Ab Hamid, M. R., Sami, W., & Mohmad Sidek, M. H. (2017). Discriminant validity assessment: Use of Fornell & Larcker criterion versus the HTMT criterion. *Journal of Physics: Conference Series*, 890, 012163. <https://doi.org/10.1088/1742-6596/890/1/012163>
- Abiddin, N. Z., Ibrahim, I., & Aziz, S. A. A. (2022). A literature review of the work-from-home phenomenon during COVID-19 toward Employees' performance and quality of life in Malaysia and Indonesia. *Frontiers in Psychology*, 13, 819860. <https://doi.org/10.3389/fpsyg.2022.819860>
- Adamovic, M., Gahan, P., Olsen, J., Gulyas, A., Shallcross, D., & Mendoza, A. (2021). Exploring the adoption of virtual work: The role of virtual work self-efficacy and virtual work climate. *The International Journal of Human Resource Management*, 33(17), 3492-3525. <https://doi.org/10.1080/09585192.2021.1913623>

- Ahmad, S., Wasim, S., Irfan, S., Gogoi, S., Srivastava, A., & Farheen, Z. (2019). Qualitative v/s. quantitative research - A summarized review. *Journal of Evidence-Based Medicine and Healthcare*, 6(43), 2828-2832. <https://doi.org/10.18410/jebmh/2019/587>
- AlAbri, S., Taghizadeh, S. K., Khan, G. M., & Rahman, S. A. (2022). Exploratory innovation, exploitative innovation and operational performance: Influence of informal social relations in environmental competitiveness. *Quality & Quantity*, 56(3), 1223-1244. <https://doi.org/10.1007/s11135-021-01173-z>
- Alejandro, B. A., Pérez, N. B., & Rivera, F. M. (2023). Understanding the lived experience of ICT-trained teachers in online classes. *Asian Journal of University Education*, 19(3), 563-572. <https://doi.org/10.24191/ajue.v19i3.23982>
- Alerasoul, S. A., Afeltra, G., Hakala, H., Minelli, E., & Strozzi, F. (2022). Organisational learning, learning organisation, and learning orientation: An integrative review and framework. *Human Resource Management Review*, 32(3), 100854. <https://doi.org/10.1016/j.hrmr.2021.100854>
- Ali, H. Y., Asrar-ul-Haq, M., Amin, S., Noor, S., Haris-ul-Mahasbi, M., & Aslam, M. K. (2020). Corporate social responsibility and employee performance: The mediating role of employee engagement in the manufacturing sector of Pakistan. *Corporate Social Responsibility and Environmental Management*, 27(6), 2908-2919. <https://doi.org/10.1002/csr.2011>
- Alzahrani, M., Alrashed, Y., Jdaitawi, M., Abdulghani, S., Nasr, N., Ghanem, R., & Kholif, M. (2023). Determinants affecting student engagement in online learning: Examining teaching styles and students' computer self-efficacy. *Asian Journal of University Education*, 19(3), 573-581. <https://doi.org/10.24191/ajue.v19i3.23965>
- Aminuddin, A. S., Amran, A., Suhaimin, M. F., Pauzi, N. M., & Kozako, I. N. A. M. F. (2025). Effects of motivation, self-efficacy, efficiency, and qualities on academician's job performance during work from home (WFH). *Environment-Behaviour Proceedings Journal*, 10(SI26), 105-111. <https://doi.org/10.21834/e-bpj.v10iSI26.6806>
- Amran, A., Suhaimin, M. F., Pauzi, N. M., Kozako, I. N. A. M. F., & Aminuddin, A. S. (2022). The influence factors of telework on employees' job performance among academia in higher educational institutions. *International Journal of Academic Research in Accounting Finance and Management Sciences*, 12(3), 238-248. <https://doi.org/10.6007/IJARAFMS /v12-i3/14533>
- Argote, L., Lee, S., & Park, J. (2021). Organizational learning processes and outcomes: Major findings and future research directions. *Management Science*, 67(9), 5399-5429. <https://doi.org/10.1287/mnsc.2020.3693>
- Chudoba, K. M., Wynn, E., Lu, M., & Watson-Manheim, M. B. (2005). How virtual are we? Measuring virtuality and understanding its impact in a global organization dynamic. *Information Systems Journal*, 15(4), 279-306. <https://doi.org/10.1111/j.1365-2575.2005.00200.x>
- Connor, M., Mueller, B., Mann, S., & Andrew, M. (2021). Pivots, pirouettes, and practicalities: Actions and reactions of work-integrated learning practitioners. *Journal of University Teaching and Learning Practice*, 18(5), 17-34. <https://doi.org/10.53761/1.18.5.2>
- Derrick, J., Willems, T., & Poon, K. W. (2022). Researching informal workplace learning in the context of remote working in the post-COVID-19 world. *The Hungarian Educational Research Journal*, 12(4), 445-459. <https://doi.org/10.1556/063.2021.00094>
- Digap, W. P., & Quines, L. A. (2022). The mediating effect of team member effectiveness on the relationship between principal leadership styles and professional self-esteem of teachers. *European Journal of Education Studies*, 9(12). <http://dx.doi.org/10.46827/ejes.v9i12.4579>

- Ferreira, J. J., Fernandes, C. I., Rammal, H. G., & Veiga, P. M. (2021). Wearable technology and consumer interaction: A systematic review and research agenda. *Computers in Human Behavior*, 118, 106710. <https://doi.org/10.1016/j.chb.2021.106710>
- Hair, J. F., Risher, J. J., Sarstedt, M., Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Halmen, E., Lamsali, H., & Iteng, R. (2024). The impact of virtual work on employee adaptive performance in the IT industry. *PaperASIA*, 40(6b), 245-256. <https://doi.org/10.59953/paperasia.v40i6b.193>
- Hamid, R. A. (2023). The effect of work from home on adaptive performance and moderated by humble leadership. *European Journal of Social Sciences*, 6(1), 31-45. <https://doi.org/10.2478/eujss-2023-0004>
- Hodzic, S., Kubicek, B., Uhlig, L., & Korunka, C. (2021). Activity-based flexible offices: Effects on work-related outcomes in a longitudinal study. *Ergonomics*, 64(4), 455-473. <https://doi.org/10.1080/00140139.2020.1850882>
- HRM Asia. (2024). *Mental health of employees impacted by work from home arrangements*. <https://hrmasia.com/mental-health-of-employees-impacted-by-work-from-home-arrangements/>
- Karl, K. A., Peluchette, J. V., & Aghakhani, N. (2021). Virtual work meetings during the COVID-19 pandemic: The good, bad, and ugly. *Small Group Research*, 53(3), 343-365. <https://doi.org/10.1177/10464964211015286>
- Khan, Z., & Charan, P. (2023). Work-from-home security issues and risk over internet. *Sustainable Environment, Manifestation and Augmentation*, 1, 468-472. https://www.researchgate.net/publication/370324808_Work-from-home_Security_Issues_and_Risk_over_Internet
- Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). Guilford Press.
- Lewin, K. (1947). Frontiers in group dynamics: Concept, method and reality in social science; social equilibria and social change. *Human Relations*, 1(1), 5-41. <https://doi.org/10.1177/001872674700100103>
- Lindstrom, D. L., Schmidt-Crawford, D., & Thompson, A. D. (2021). Flexible but languishing: What we have learned about virtual working and learning. *Journal of Digital Learning in Teacher Education*, 37(3), 150-151. <https://doi.org/10.1080/21532974.2021.1936985>
- Loughlin, E. M., & Priyadarshini, A. (2021). Adaptability in the workplace: Investigating the adaptive performance job requirements for a project manager. *Project Leadership and Society*, 2, 100012. <https://doi.org/10.1016/j.plas.2021.100012>
- Moffitt, D. (2024, April 17). *Remote work statistics and trends for 2024: Insights unveiled*. Zoe Talent Solutions. <https://zoetalentsolutions.com/remote-work-statistics/>
- Moşteanu, N. R. (2024). Adapting to the unpredictable: Building resilience for business continuity in an ever-changing landscape. *European Journal of Theoretical and Applied Sciences*, 2(1), 444-457. [https://doi.org/10.59324/ejtas.2024.2\(1\).37](https://doi.org/10.59324/ejtas.2024.2(1).37)
- Ojanperä, T., Mäkelä, J., Mämmelä, O., Majanen, M., & Martikainen, O. (2018, June). Use cases and communications architecture for 5G-enabled road safety services. In *Proceedings of the 2018 European Conference on Networks and Communications (EuCNC)* (pp. 335–340). IEEE. <https://doi.org/10.1109/EuCNC.2018.8443193>

- Pretti, T. J., Etmanski, B., & Durston, A. (2020). Remote work-integrated learning experiences: Student perceptions. *International Journal of Work-Integrated Learning*, 21(4), 401-414. <https://eric.ed.gov/?id=EJ1271299>
- Pulakos, E. D., Arad, S., Donovan, M. A., & Plamondon, K. E. (2000). Adaptability in the workplace: Development of a taxonomy of adaptive performance. *Journal of Applied Psychology*, 85(4), 612-624. <https://doi.org/10.1037/0021-9010.85.4.612>
- Raghuram, S., Hill, N. S., Gibbs, J. L., & Maruping, L. M. (2019). Virtual work: Bridging research clusters. *Academy of Management Annals*, 13(1), 308-341. <https://doi.org/10.5465/annals.2017.0020>
- Spiteri, M., & Rundgren, S. C. (2020). Literature review on the factors affecting primary teachers' use of digital technology. *Technology, Knowledge, and Learning*, 25(1), 115-128. <https://doi.org/10.1007/s10758-018-9376-x>
- Vinueza-Cabezas, A., Osejo-Taco, G., Unda-López, A., Paz, C., & Hidalgo-Andrade, P. (2022). A comparison of working conditions and workers' perceptions among on-site, telework, and hybrid workers in Ecuador during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 19(21), 14337. <https://doi.org/10.3390/ijerph192114337>
- Vuchkovski, D., Zalaznik, M., Mitreĝa, M., & Pfajfar, G. (2023). A look at the future of work: The digital transformation of teams from conventional to virtual. *Journal of Business Research*, 163, 113912. <https://doi.org/10.1016/j.jbusres.2023.113912>
- Wang, F. (2025, January). Assessing the digital competence of preschool teachers using the fuzzy analytic hierarchy process. In *Proceedings of the 2025 International Conference on Intelligent Systems and Computational Networks (ICISCN)* (pp. 1-6). IEEE. <https://doi.org/10.1109/ICISCN64258.2025.10934678>
- Waworuntu, E. C., Kainde, S. J. R., & Mandagi, D. W. (2022). Work-life balance, job satisfaction, and performance among millennial and Gen Z employees: A systematic review. *Society*, 10(2), 384-398. <https://doi.org/10.33019/society.v10i2.464>
- Whillans, A., Perlow, L., & Turek, A. (2021). Experimenting during the shift to virtual teamwork: Learnings from how teams adapted their activities during the COVID-19 pandemic. *Information and Organization Dynamic*, 31(1), 100343. <https://doi.org/10.1016/j.infoandorg.2021.100343>
- Zahar, N. N., Ismail, F., & Rashid, U. K. (2021). Challenges and critical success factors in managing virtual teams: The workplace of the future. *Advances in Humanities and Contemporary Studies*, 2(1), 8-14. <https://publisher.uthm.edu.my/periodicals/index.php/ahcs/article/view/643>

About the Authors

Norfadzilah Abdul Razak, PhD, holds a PhD in Management from Universiti Utara Malaysia and is currently a Senior Lecturer at the Faculty of Business and Management. She also serves as the Head of Professional at the Institute of Business Excellence. Her expertise and research interests focus on data analytics, management, and organizational behaviour. She has contributed to several academic and professional initiatives that enhance knowledge integration in these areas. She is the corresponding author and can be reached at norfadzilah0438@uitm.edu.my.



© 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).