



## Digital Pedagogical Transformation and Teacher Work Engagement in Secondary Schools

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### Abstract

*This study investigates the impact of digital pedagogical transformation on teacher work engagement among secondary school teachers in Selangor, Malaysia. Grounded in the Job Demands–Resources (JD-R) model, the study aims to examine how digital-related job demands and job resources influence teachers' levels of vigor, dedication, and absorption. A quantitative research design was employed using a cross-sectional survey of 320 teachers, and the data were analyzed using Partial Least Squares Structural Equation Modeling. The findings indicate that digital job resources have a strong positive effect on teacher work engagement, while digital job demands have a significant negative effect. However, the influence of resources is more dominant, suggesting that supportive conditions can mitigate the adverse effects of digital workload and complexity. These results demonstrate that digital transformation operates as a dual mechanism, acting both as an enabler and a constraint depending on contextual factors. The novelty of this study lies in its integrative approach, conceptualizing digital pedagogical transformation as a multidimensional construct within the JD-R framework. The study contributes to theory by extending the application of the JD-R model in digital education contexts and provides practical implications for policymakers to design balanced strategies that enhance teacher support. The findings highlight the importance of prioritizing teacher-centered approaches in achieving sustainable digital transformation in education.*

## INTRODUCTION

The accelerating integration of digital technologies into education systems has fundamentally reshaped teaching practices, institutional structures, and professional expectations of teachers worldwide. In recent years, education systems have undergone a significant shift toward digitally mediated learning environments, driven by globalization, technological advancement, and the increasing demand for twenty-first century skills. Within this global trajectory, Malaysia has positioned itself as a proactive actor in educational transformation through comprehensive policy frameworks such as the Malaysia Education Blueprint 2013–2025, which

emphasizes digital innovation, teacher competency development, and student-centered pedagogies. These reforms are intended to enhance educational quality and international competitiveness; however, they simultaneously introduce complex challenges that may influence teachers' psychological and professional engagement (Huang et al., 2025).

Teacher work engagement, defined as a positive and fulfilling work-related state characterized by vigor, dedication, and absorption (Coelho et al., 2025; Anggraheni et al. 2025), has been widely acknowledged as a critical factor influencing teaching effectiveness and student outcomes. Engaged teachers demonstrate higher levels of motivation, resilience, and instructional quality, which are essential for sustaining educational improvement in rapidly changing environments. Nevertheless, the expansion of digital pedagogical practices has altered the nature of teaching work, often increasing job demands through additional administrative tasks, technological adaptation, and continuous performance monitoring (Rastegar & Rahimi, 2023; Iqbal & Ali, 2024). As a result, understanding how digital transformation interacts with teacher work engagement has become an urgent research priority.

In the Malaysian context, digital transformation in education has been significantly accelerated by both policy initiatives and external disruptions, particularly the COVID-19 pandemic. The sudden transition to online and hybrid learning environments required teachers to rapidly acquire digital competencies and redesign instructional strategies (Ivanov et al., 2025; Diab, 2023; Kučera & Haffner, 2025). Empirical studies have shown that many teachers experienced increased workload, technological stress, and role ambiguity during this transition (Starrett, 2022; Zarabi & Amirian, 2025). While some educators adapted successfully and demonstrated innovative teaching practices, others struggled due to limited training, inadequate institutional support, and uneven access to digital resources. These mixed outcomes suggest that digital transformation does not uniformly enhance teaching effectiveness, but rather interacts with contextual and organizational factors that shape teacher experiences.

This study focuses specifically on secondary school teachers in Selangor, a highly urbanized and economically advanced state that serves as a central hub for educational innovation in Malaysia. Selangor is characterized by relatively well-developed digital infrastructure, widespread internet connectivity, and strong governmental support for smart education initiatives. Schools in this region are often at the forefront of implementing digital learning platforms, blended learning models, and data-driven assessment systems. However, despite these advantages, teachers in Selangor also face heightened expectations for performance, accountability, and technological proficiency. The coexistence of high resource availability and high job demands makes Selangor an analytically significant context for examining the dual impact of digital transformation on teacher work engagement (Zulkurnain et al., 2025; Razak et al., 2023).

From a theoretical perspective, the Job Demands–Resources (JD-R) model has been extensively used to explain variations in employee engagement across different organizational settings. The model posits that job demands, such as workload and role complexity, can lead to stress and burnout, while job resources, including autonomy, support, and professional development opportunities, can enhance motivation and engagement (Wang, 2024; Wang et al., 2024). Recent studies have extended the JD-R model to educational contexts, demonstrating that teacher engagement is strongly influenced by the balance between demands and resources (Granziera, 2022; Collie, 2023). However, the application of this model in digitally transforming education systems remains underexplored, particularly in developing countries where institutional capacities and technological readiness vary significantly.

Existing literature on digital education in Malaysia has predominantly focused on student outcomes, technology acceptance, and policy implementation (Rosli et al., 2022; Ahmad, 2022). While these studies provide valuable insights into the effectiveness of digital initiatives, they often overlook the role of teachers as central agents of educational change. Conversely, research on teacher work engagement has primarily examined factors such as leadership, organizational climate, and self-efficacy, with limited attention to the structural impact of digital transformation. This separation of research domains has resulted in a fragmented understanding of how technological change influences teachers' psychological and professional experiences.

Furthermore, recent international studies have highlighted the ambivalent nature of digital transformation in education. On one hand, digital tools can enhance instructional flexibility, facilitate innovative pedagogies, and improve access to learning resources (Oyedotun, 2024; Bizami et al., 2023). On the other hand, they can increase cognitive load, blur work-life boundaries, and intensify administrative responsibilities (Adisa et al., 2020; Kamboj & A, 2025). These contradictory effects suggest that digital transformation functions simultaneously as a job resource and a job demand, depending on the context in which it is implemented. However, empirical evidence examining this dual role within specific regional contexts remains limited.

In the case of Selangor, the rapid adoption of digital education has introduced new forms of professional expectation that extend beyond traditional teaching roles. Teachers are required not only to deliver content but also to manage digital platforms, analyze student data, and continuously update their technological skills (Josué et al., 2023; Bitakou et al., 2023). These additional responsibilities may influence their level of engagement in complex ways. While access to digital tools may enhance teaching efficiency and creativity, the associated pressures may also reduce teachers' sense of autonomy and well-being. Despite the importance of this issue, there is a lack of empirical research that systematically examines how digital pedagogical transformation affects teacher work engagement within this specific context (Lillelien & Jensen, 2025).

The state of the art in current literature indicates a growing interest in the intersection between digital transformation and teacher well-being; however, most studies remain either technologically oriented or psychologically oriented, without integrating both perspectives into a comprehensive analytical framework. This gap is particularly evident in Southeast Asian contexts, where rapid educational reforms are often implemented without sufficient attention to teacher experiences. Therefore, there is a need for integrative research that captures the complexity of digital transformation as both an opportunity and a challenge for teachers.

Addressing this gap, the present study aims to investigate the relationship between digital pedagogical transformation and teacher work engagement among secondary school teachers in Selangor, Malaysia. Specifically, it examines how digital-related job demands and job resources influence teachers' levels of vigor, dedication, and absorption. The novelty of this research lies in its integrative approach, which combines the JD-R model with the concept of digital pedagogical transformation to provide a more comprehensive understanding of teacher engagement in contemporary education systems. Unlike previous studies that treat digitalization and engagement as separate constructs, this study conceptualizes digital transformation as a contextual factor that simultaneously generates demands and resources.

The study contributes to the literature in several ways. Theoretically, it extends the JD-R model by incorporating digital transformation as a multidimensional construct

within educational settings. Empirically, it provides context-specific evidence from Selangor, offering insights into how teachers navigate digital reforms in a high-capacity yet high-pressure environment. Practically, the findings are expected to inform policymakers and school leaders in designing balanced digital education strategies that enhance teacher engagement while minimizing negative impacts on workload and well-being. Through this integrative and context-sensitive approach, the study seeks to advance current understanding of teacher work engagement in the era of digital transformation.

## **METHODS**

### **Research Design**

This study adopts a quantitative research design using a cross-sectional survey approach to examine the relationship between digital pedagogical transformation and teacher work engagement in secondary schools. A quantitative approach is considered appropriate as it enables the measurement of relationships among variables and allows for statistical generalization within a defined population (Creswell, 2014). The cross-sectional design facilitates the collection of data at a single point in time, capturing teachers' perceptions and experiences of digital transformation within their current professional context.

The study is grounded in the Job Demands–Resources (JD-R) model, which conceptualizes work engagement as a function of the balance between job demands and job resources (Bakker & Demerouti, 2007). In this research, digital pedagogical transformation is operationalized as a multidimensional construct comprising both job demands (e.g., technological workload, digital complexity) and job resources (e.g., access to digital tools, institutional support, training opportunities). Teacher work engagement is measured through three dimensions: vigor, dedication, and absorption.

### **Research Context and Location**

The study was conducted in public secondary schools located in Selangor. Selangor is one of the most developed and urbanized states in Malaysia, characterized by advanced digital infrastructure, high internet penetration, and strong policy support for digital education initiatives. Schools in this region have actively implemented digital learning platforms, blended learning models, and data-driven assessment systems, making it a relevant context for examining digital pedagogical transformation.

Despite these advantages, teachers in Selangor face increasing professional demands related to digital integration, including continuous adaptation to new technologies and increased administrative responsibilities. This combination of high resource availability and high job demands provides a suitable empirical setting for analyzing the dual role of digital transformation within the JD-R framework.

### **Population and Sampling**

The target population of this study consists of secondary school teachers employed in public schools in Selangor. A stratified random sampling technique was used to ensure representation across different school types and districts. Stratification was based on urban and semi-urban school locations to capture variations in digital resource availability and institutional support.

A total of 320 teachers were selected as respondents. This sample size meets the minimum requirement for multivariate statistical analysis, including Structural Equation Modeling (SEM), which generally requires a sample size of at least 200 to ensure statistical power and model stability (Jobst et al., 2023). The respondents

include teachers from various subject areas, teaching experiences, and demographic backgrounds, ensuring diversity and representativeness.

### Data Collection Techniques

Data were collected using a structured self-administered questionnaire distributed both online and in paper format. The use of a questionnaire allows for efficient data collection from a large number of respondents and ensures standardization of responses. The online survey was distributed via email and professional teacher networks, while printed questionnaires were administered in selected schools to increase response rates.

The questionnaire consists of three main sections. The first section captures demographic information such as gender, age, teaching experience, and subject specialization. The second section measures digital pedagogical transformation, including both job demands and job resources related to digital teaching. The third section assesses teacher work engagement using a validated scale.

All items were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The instrument was adapted from established scales, including the Utrecht Work Engagement Scale (UWES) for measuring engagement (Schaufeli et al., 2006) and previous studies on digital transformation in education.

### Measurement of Variables

The operationalization of variables in this study is presented in Table 1.

Table 1. Measurement of Research Variables

Variable	Dimension	Number of Items	Source
Digital Pedagogical Transformation	Digital Job Demands	6	Adapted from Taris et al. (2017)
	Digital Job Resources	6	Adapted from Bakker & Demerouti (2007)
Teacher Work Engagement	Vigor	3	Schaufeli et al. (2006)
	Dedication	3	Schaufeli et al. (2006)
	Absorption	3	Schaufeli et al. (2006)

As shown in Table 1, digital pedagogical transformation is treated as a second-order construct comprising job demands and job resources, while teacher work engagement is measured through three core dimensions. This multidimensional measurement approach allows for a more nuanced analysis of the relationships among variables.

### Data Analysis Techniques

Data analysis was conducted using Structural Equation Modeling (SEM) with Partial Least Squares (PLS-SEM). This method is suitable for complex models involving latent variables and is particularly effective for exploratory and predictive research. PLS-SEM allows simultaneous assessment of the measurement model (validity and reliability) and the structural model (hypothesis testing).

The analysis was conducted in two stages. First, the measurement model was evaluated to assess convergent validity, discriminant validity, and internal consistency reliability. Convergent validity was examined using factor loadings and Average Variance Extracted (AVE), with acceptable thresholds of 0.70 and 0.50 respectively. Discriminant validity was assessed using the Fornell-Larcker criterion and cross-loadings. Reliability was evaluated using Cronbach's alpha and composite reliability, with values above 0.70 considered acceptable.

Second, the structural model was analyzed to test the hypothesized relationships between digital pedagogical transformation and teacher work engagement. Path coefficients, t-values, and p-values were obtained through bootstrapping procedures with 5,000 resamples to ensure robustness of the results. Additionally, the coefficient of determination ( $R^2$ ) was used to assess the explanatory power of the model.

### Validity and Reliability

To ensure the rigor of the study, several procedures were implemented to establish validity and reliability. Content validity was ensured through expert review, where the questionnaire was evaluated by three experts in educational research and digital pedagogy. Their feedback was used to refine item clarity and relevance.

Construct validity was assessed through factor analysis within the PLS-SEM framework. Items with low factor loadings ( $<0.70$ ) were removed to improve model quality. Convergent and discriminant validity were evaluated using established criteria as recommended by Cheung et al. (2024).

Reliability was assessed using Cronbach's alpha and composite reliability coefficients. All constructs demonstrated reliability values above the recommended threshold of 0.70, indicating satisfactory internal consistency. Additionally, a pilot study involving 30 teachers was conducted prior to the main data collection to test the reliability of the instrument and identify potential issues.

To minimize common method bias, procedural remedies were applied, including ensuring respondent anonymity, using clear and concise instructions, and varying item wording. Harman's single-factor test was also conducted, confirming that no single factor accounted for the majority of variance, indicating that common method bias was not a significant concern.

## RESULTS AND DISCUSSION

This section presents the empirical findings of the study on the relationship between digital pedagogical transformation and teacher work engagement among secondary school teachers in Selangor, Malaysia. The analysis is structured into several subsections. First, it describes the demographic characteristics of respondents to provide contextual understanding of the sample. Second, it evaluates the measurement model, including validity and reliability assessments. Third, it examines the structural model and hypothesis testing using PLS-SEM. Finally, it reports the explanatory power of the model and the overall interpretation of the statistical findings.

### Respondent Characteristics

A total of 320 valid responses were analyzed in this study. The demographic profile of respondents provides an overview of the distribution of participants across gender, age, teaching experience, and subject specialization.

Table 2. Demographic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	128	40.0
	Female	192	60.0
Age	21–30 years	76	23.8
	31–40 years	124	38.8
	41–50 years	82	25.6
	>50 years	38	11.9
Teaching Experience	<5 years	68	21.3
	5–10 years	110	34.4
	11–20 years	96	30.0

	>20 years	46	14.4
School Location	Urban	198	61.9
	Semi-urban	122	38.1

Source: Primary survey data, 2026

As shown in Table 2, the majority of respondents were female (60%), reflecting the gender distribution commonly found in the teaching profession. Most teachers were within the 31–40 age range (38.8%), indicating a relatively experienced workforce. In terms of teaching experience, a significant proportion had between 5 and 10 years of experience (34.4%), suggesting familiarity with both traditional and digital teaching practices. Additionally, the majority of respondents were from urban schools (61.9%), which aligns with the high level of digital infrastructure availability in Selangor.

### Descriptive Statistics

To provide an overview of the distribution of key variables, descriptive statistics including mean and standard deviation were calculated for digital job demands, digital job resources, and teacher work engagement.

Table 3. Descriptive Statistics of Study Variables

Variable	Mean	Standard Deviation
Digital Job Demands	3.45	0.72
Digital Job Resources	4.12	0.68
Teacher Work Engagement	3.98	0.65

Source: Processed data, 2026

The results indicate that digital job resources have the highest mean score, suggesting that teachers perceive a relatively high level of institutional and technological support. In contrast, digital job demands show a moderate mean, reflecting the presence of workload pressures associated with digital transformation. Teacher work engagement is also relatively high, indicating that teachers maintain positive professional involvement despite the challenges.

### Measurement Model Evaluation

The measurement model was assessed to ensure the validity and reliability of the constructs before proceeding to hypothesis testing. This evaluation included convergent validity, discriminant validity, and internal consistency reliability. Figure 2 presents the measurement model of the study.

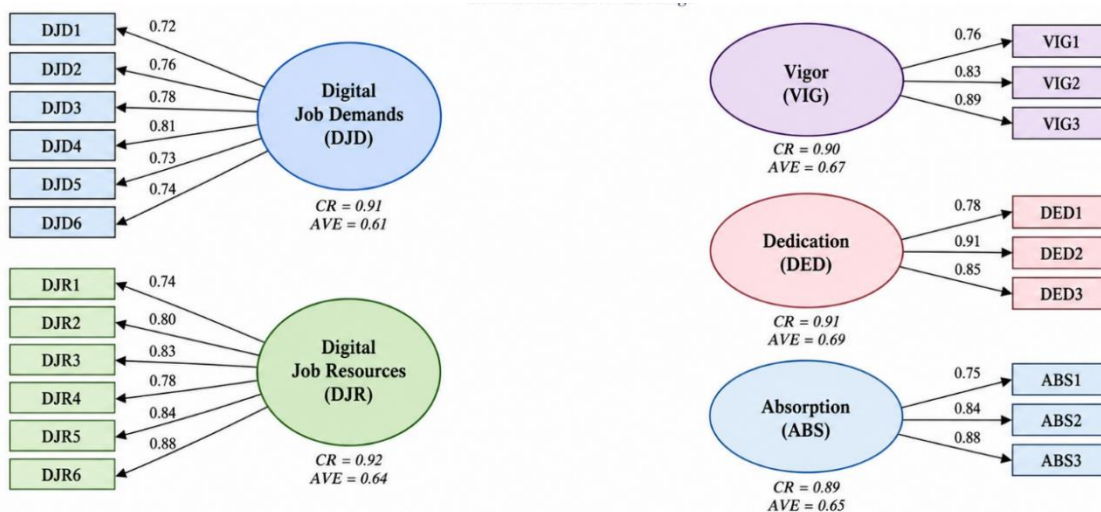


Figure 1. Measurement Model (Outer Model)

Source: Processed data using PLS-SEM, 2026

As shown in Figure 1, all indicators exhibit strong factor loadings exceeding the recommended threshold of 0.70, indicating satisfactory indicator reliability. The constructs of digital job demands, digital job resources, and teacher work engagement demonstrate adequate convergent validity and internal consistency.

### **Convergent Validity**

Convergent validity was assessed using factor loadings and Average Variance Extracted (AVE). All items demonstrated factor loadings above the recommended threshold of 0.70, indicating strong correlations between indicators and their respective constructs.

Table 3. Convergent Validity Results

<b>Construct</b>	<b>Item Loadings Range</b>	<b>AVE</b>	<b>Composite Reliability</b>
Digital Job Demands	0.72 – 0.86	0.61	0.91
Digital Job Resources	0.74 – 0.88	0.64	0.92
Vigor	0.76 – 0.89	0.67	0.90
Dedication	0.78 – 0.91	0.69	0.91
Absorption	0.75 – 0.88	0.65	0.89

Source: Processed data using PLS-SEM, 2026

Table 3 shows that all constructs have AVE values above 0.50, confirming adequate convergent validity. Composite reliability values also exceed 0.70, indicating strong internal consistency across all constructs.

### **Discriminant Validity**

Discriminant validity was evaluated using the Fornell-Larcker criterion.

Table 4. Discriminant Validity (Fornell-Larcker Criterion)

<b>Construct</b>	<b>DJD</b>	<b>DJR</b>	<b>Vigor</b>	<b>Dedication</b>	<b>Absorption</b>
Digital Job Demands (DJD)	<b>0.78</b>				
Digital Job Resources (DJR)	0.52	<b>0.80</b>			
Vigor	-0.41	0.58	<b>0.82</b>		
Dedication	-0.38	0.61	0.67	<b>0.83</b>	
Absorption	-0.35	0.55	0.63	0.66	<b>0.81</b>

Source: Processed data using PLS-SEM, 2026

The square root of AVE (diagonal values) is higher than the inter-construct correlations, indicating satisfactory discriminant validity.

### **Reliability Analysis**

Reliability was assessed using Cronbach's alpha and composite reliability.

Table 5. Reliability Analysis

<b>Construct</b>	<b>Cronbach's Alpha</b>	<b>Composite Reliability</b>
Digital Job Demands	0.89	0.91
Digital Job Resources	0.90	0.92
Teacher Work Engagement	0.93	0.94

Source: Processed data, 2026

All values exceed the threshold of 0.70, confirming that the measurement model is reliable.

## Structural Model Evaluation

After establishing the validity and reliability of the measurement model, the structural model was assessed to examine the relationships between variables.

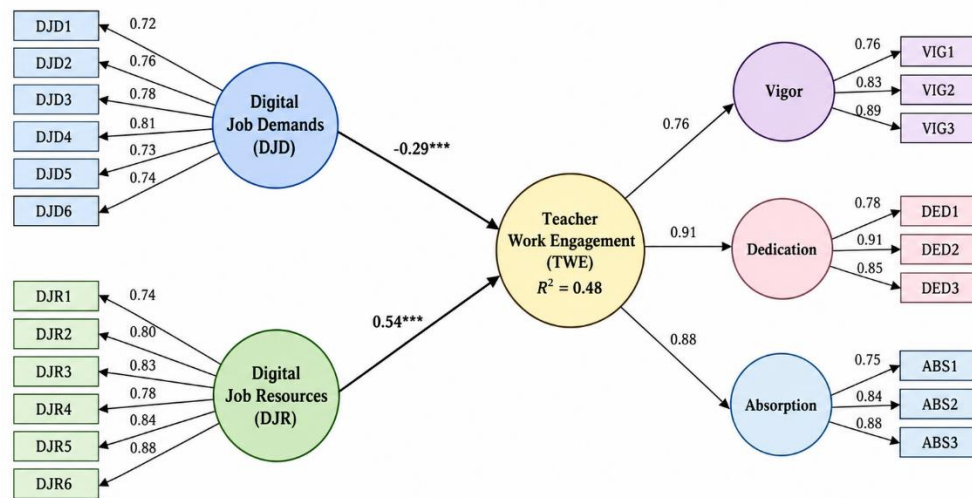


Figure 2. Structural Model of Digital Pedagogical Transformation and Teacher Work Engagement

Source: Processed data using PLS-SEM, 2026

As shown in Figure 2, digital job resources positively influence teacher work engagement ( $\beta = 0.54$ ), while digital job demands have a negative effect ( $\beta = -0.29$ ). Teacher work engagement is reflected by vigor, dedication, and absorption.

### Hypothesis Testing

The structural model was analyzed using bootstrapping with 5,000 resamples.

Table 6. Path Coefficients and Hypothesis Testing

Hypothesis	Relationship	Path Coefficient ( $\beta$ )	t-value	p-value	Result
H1	Digital Job Demands $\rightarrow$ Work Engagement	-0.29	4.87	0.000	Supported
H2	Digital Job Resources $\rightarrow$ Work Engagement	0.54	9.21	0.000	Supported

Source: PLS-SEM Output, 2026

The results indicate that digital job demands have a significant negative effect on teacher work engagement ( $\beta = -0.29$ ,  $p < 0.001$ ), suggesting that increased technological workload and complexity reduce teachers' engagement levels. Conversely, digital job resources have a strong positive effect on work engagement ( $\beta = 0.54$ ,  $p < 0.001$ ), indicating that access to digital tools, training, and institutional support enhances teachers' motivation and involvement.

### Coefficient of Determination ( $R^2$ )

The explanatory power of the model was assessed using  $R^2$  values.

Table 7. Coefficient of Determination

Endogenous Variable	$R^2$ Value	Result
Teacher Work Engagement	0.48	Moderate

Source: Processed data, 2026

The  $R^2$  value of 0.48 indicates that 48% of the variance in teacher work engagement is explained by digital job demands and digital job resources. This suggests a moderate level of explanatory power, indicating that other factors may also contribute to work engagement.

### **Effect Size ( $f^2$ )**

Effect size was calculated to determine the contribution of each predictor.

Table 8. Effect Size ( $f^2$ )

<b>Relationship</b>	<b><math>f^2</math></b>	<b>Result</b>
Digital Job Demands → Engagement	0.10	Small
Digital Job Resources → Engagement	0.32	Medium

Source: Processed data, 2026

The results show that digital job resources have a stronger effect on work engagement compared to digital job demands.

The stronger influence of digital job resources underscores the importance of creating supportive and enabling environments in digitally transforming schools. It suggests that the success of digital pedagogical transformation depends not only on the availability of technology but also on how well teachers are supported in using it. This insight contributes to a more nuanced understanding of digital transformation as a socio-organizational process, where human factors play a central role in determining outcomes.

### **Balancing Digital Demands and Resources in Shaping Teacher Work Engagement in Malaysian Secondary Education**

This study set out to examine the relationship between digital pedagogical transformation and teacher work engagement among secondary school teachers in Selangor, Malaysia, through the lens of the Job Demands–Resources (JD-R) model. The findings reveal a dual and asymmetric effect: digital job resources significantly enhance teacher work engagement, while digital job demands exert a negative influence. This section discusses these findings in relation to existing literature, theoretical implications, and practical significance within the broader context of digitally transforming education systems.

The finding that digital job resources positively influence teacher work engagement is consistent with a substantial body of research grounded in the JD-R framework. Previous studies have demonstrated that access to resources such as institutional support, technological infrastructure, and professional development opportunities enhances motivation and engagement among educators (Dahri et al., 2024; Juškevičienė et al., 2024). In the context of digital education, Yang & Du (2020) argue that well-supported digital environments enable teachers to adopt innovative pedagogies, thereby increasing their sense of efficacy and professional fulfillment. Similarly, Alshidi & Rashid (2025) found that ICT integration, when supported by adequate training and leadership, positively impacts teacher performance and motivation in Malaysian schools.

The present results build on this research issue and show that digital resources have a pre-eminent part in the development of teacher engagement in a high capacity educational system like Selangor. The comparatively high path coefficient with digital job resources is an indication that enabling conditions make teachers more receptive than limiting in terms of technological needs when there is an adequate support. It coincides with the recent findings on the significance of organizational preparedness and the growth of digital competence as the key to positive teacher outcomes (Ivanov

et al., 2025). Thus, a digital transformation with proper resources can become a booster of increasing teacher engagement instead of a disruption.

On the other hand, the impact of digital job demands on teacher work engagement is negative, which confirms previous results that indicate the difficulties involved in integrating technology into education. Research carried out during and following the COVID-19 pandemic has continued to reveal a problem of workload, digital fatigue, and role ambiguity in teachers (Gupta, 2026; Rastegar & Rahimi, 2023). Ni et al. (2024) also suggest that job demands such as administrative work overload and time pressures may also result in emotional exhaustion and decreased engagement. These issues are supported by the current research, as the results indicate that digital requirements, including managing online platforms, changing teaching materials, and dealing with online assessments, may adversely affect the psychological engagement of teachers.

But there is a significant point that comes out of this study. Digital job demands also have a statistically significant negative effect, but their impact is relatively less than that of digital job resources. This indicates that the negative consequences of digital demands can be alleviated in case there are enough resources. The JD-R buffering hypothesis suggests that job resources have the ability to mitigate the adverse effect of job demands on worker well-being (Silveri & Petti, 2026). With relatively good digital infrastructure and policy support in the context of Selangor, the challenges of digital transformation may be easier to manage by the teachers.

The other significance of this research is its contextual specificity. Although earlier studies in the field of digital education have tended to consider the topic in a generalized or cross-national manner, this study offers empirical data on Selangor, a region which is both technologically well endowed, and also very demanding in terms of performance. The results indicate that the digital transformation in resource-abundant settings does not necessarily lead to positive results. Rather, its effects are related to the experience of the balance between demands and resources among teachers. This observation contributes to the increasing understanding that digital transformation is not only a technical process but also a socio-organizational phenomenon (Madjebri, 2026).

The research also advances the literature by incorporating digital pedagogical change to JD-R model as a multidimensional construct. In contrast to other research where technology adoption is viewed as an independent variable, this study views digital transformation to both produce job demands and job resources. This synthesizing method offers a less rigid explanation of the role of digitalization on teacher engagement and emphasizes discussing positive and negative aspects of technological change. Through this, the research contributes to theoretical debates on how conventional organizational frameworks can be transformed to the current digital environments.

Practically, the results have a number of significant implications to policy makers, school administrators and teaching professionals. First, the substantial beneficial impact of online job resources highlights the importance of the long-term investment in teacher support technologies, such as professional growth, technical support, and cooperative learning. It is important that policymakers should make sure that the initiatives of digital transformation are followed by extensive training programs that increase the digital competencies and the pedagogical skills of teachers.

Second, the adverse effect of the digital job demands raises the significance of workload management and the reduction of unwarranted administrative overhead. To minimize cognitive load, schools need to think of simplifying the process of digital reporting and offering convenient platforms. Moreover, the school leaders are

important in fostering conducive organizational environments that promote experimentation and minimize pressure on performance.

Third, the results indicate that digital transformation strategies must be based on a balanced approach, which takes into account both technology and human aspects. Instead of concentrating on the development of infrastructure, policymakers need to pay increased attention to the well-being of teachers and their participation as essential signs of successful digital reform. This is in line with recent demands to be more human-centered in education innovation (Topali et al., 2025).

In spite of its contributions, this study has a number of limitations that ought to be mentioned. To begin with, cross-sectional design does not allow the establishment of causal relationships between variables. In future studies, longitudinal designs may be used to investigate the dynamics of teacher engagement across time in the face of continuing digital transformation. Second, the research is based on self-reported data, which can be subjected to response bias. The use of numerous data sources, including classroom observations or administrative records, might help to increase the strength of results.

Third, the research is limited to teachers in Selangor secondary schools and this might not be generalized to other regions or learning levels. Although Selangor is an excellent context to study because of the developed digital infrastructure, future research should consider similar relationships in less developed areas or rural environments to represent more experiences. Comparative research in other states/countries might also yield more insights on the contextual differences.

The studies to be carried out in the future should also focus on other variables that could impact teacher work engagement in digital environments. To illustrate, digital self-efficacy, leadership style, and organizational culture are some of the factors that can make great contributions to the teacher experiences. Additionally, analyzing student performance relative to teacher involvement may be a better way of assessing how digital transformation affects teaching performance.

## **CONCLUSION**

This research investigated digital pedagogical transformation and its effects on the work engagement of teachers in secondary schools in Selangor, Malaysia, in the Job Demands Resources (JD-R) framework. The results demonstrate that digital job resources are a significant positive contributor to teacher work engagement whereas digital job demands have a negative but relatively less impact. Such findings point to the fact that the effects of digital transformation are neither negative nor positive but are the outcomes of the balance between the resources of empowerment and the imposed demands.

Theoretically, this study builds on the JD-R model by incorporating digital pedagogical transformation as a multidimensional construct which incorporates both job demands and job resources in an educational setting. It gives empirical data that digital transformation can be both a motivational and a possible stressor. In practice, the results provide a focus on institutional support, professional growth, and technological infrastructure to maintain the engagement of teachers in digitally changing settings. However, the study has a limitation of having a cross-sectional nature and a restricted area of study which can limit causal interpretation and generalization. The future studies will have to utilize both longitudinal designs and comparative methods in various regions or education stages. Moreover, the introduction of other variables like digital self-efficacy and leadership support may help to gain a more profound understanding of teacher engagement. On the whole, this work highlights the importance of policy on digital education, which has to be balanced and humanistic.

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