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The Mediating Role of Behavioural Intention in the Relationship between Digital Literacy and Technology Acceptance: A Structural Equation Modelling Approach

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Abstract

Behavioural Intention (BI) has been widely acknowledged as a critical determinant of technology acceptance. However, the BI as a mediating role between Digital Literacy Skills (DLS) and Digital Technology Acceptance (DTA) remains underexplored, particularly in Technical and Vocational Education and Training (TVET) environments. This study investigates how BI mediates the relationship between students' DLS, conceptualised using the DigComp framework, and the DTA, framed within the Unified Theory of Acceptance and Use of Technology (UTAUT). A survey of 490 through stratified random sampling with two stage cluster within Malaysian TVET students represented by Politeknik Malaysia students was analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) via SmartPLS 4.0. The research instrument was adapted from established scales and validated through five expert review and pilot testing (n=30, Cronbach's Alpha > 0.7). The Higher-Order Construct (HOC) model analysis utilised a type 1: reflective-reflective disjoint two-stage approach. The constructs possess excellent internal consistency, as all Composite Reliability (CR) values for Lower Order Construct (LOC) and HOC are well above the 0.70 threshold, exceeding the commonly accepted threshold, indicating strong internal consistency for the higher-order constructs. Results from the mediation analysis confirmed that BI significantly mediates this relationship (β=0.708, t=12.124, p=0.000) in the HOC model analysis rather than in the LOC level. These findings provide empirical evidence of the motivational pathways driving technology acceptance in educational contexts. This study advances theoretical discourse by validating BI as a powerful mechanism linking DLS and DTA, offering practical insights for education practitioners aiming to foster positive attitudes and higher engagement with digital technologies among TVET learners.

1. Introduction

The rapid integration of digital technologies in Technical and Vocational Education and Training (TVET) institutions (Yang & Wu, 2024). According to Charles, Amoah-Sei, Razak and Dissou (2024), Suryawidjaja (2023) and Kuntadi et al. (2022), the shift has transformed the learning landscape, making Digital Literacy Skills (DLS) and Digital Technology Acceptance (DTA) critical competencies for student success. However, while the significance of digital competencies is widely recognised, there remains an insufficient understanding of how behavioural mechanisms, particularly BI, influence the pathway between DLS and DTA (Vo & Vansteelandt, 2022). Past research has established that digital literacy contributes to students' ability to engage with and benefit from technology-based learning environments (Alakrash & Abdul Razak, 2021; Rafi, JianMing & Ahmad, 2019; Statti & Torres, 2020; Chiu, Sun & Ismailov, 2022), yet direct relationships alone might fail to capture the behavioural factor underlying technology adoption decisions.

Despite extensive studies on technology acceptance, limited research has integrated digital competence frameworks like DigComp with intention-based (Rahim and Iqbal, 2025; Sánchez et al, 2022) and usage-based models such as Theory of Planned Behaviour (TPB) and Unified Theory of Acceptance and Use of Technology (UTAUT), supported by Hani et al (2024), Hammoda and Foli (2024), especially within TVET. Furthermore, existing research on DLS and DTA often neglects the mediating behavioural factor, leaving gaps in understanding the mechanisms by which digital literacy translates into actual technology use. A study by Antonietti, Cattaneo and Amenduni (2022) highlights that while DL significantly impacts DTA, the absence of behavioural mediators in the analysis may lead to an incomplete understanding of the adoption process. They argue incorporating behavioural factors such as user attitudes and intentions provides a more comprehensive technology acceptance model. Similarly, Gaber et al. (2023), through the study, revealed that studies excluding behavioural mediators often report inconsistent findings regarding the DL-DTA relationship. Their analysis suggests that behavioural factors are crucial in mediating this relationship, and their omission can lead to skewed results. These studies underscore the importance of including behavioural mediators in research models to accurately capture digital literacy and technology acceptance dynamics.Hence, this study aims to fill this gap by investigating the mediating role of BI in the relationship between DLS and DTA through the development and validation of a hierarchical model.This research aims to examine the influence of BI on the DLS and DTA, specifically:

Research objective: To investigate the mediating effect of BI on DLS and DTA, combining DigComp, TPB, and UTAUT dimensions.

Followed by the hypotheses formed:

Hypothesis H1: BI mediates the relationship between DLS and DTA.

Hypothesis H1.1: ATB significantly mediates the relationship between DLS and DTA among TVET students.

Hypothesis H1.2: SI significantly mediates the relationship between DLS and DTA among TVET students.

Hypothesis H1.3: PBC significantly mediates the relationship between DLS and DTA among TVET students

By identifying this mediation pathway, offers practical and theoretical implications by advancing the understanding of technology acceptance mechanisms within TVET environments.

2. Literature Review

Previous research has consistently underscored the relevance of DLS in facilitating technology adoption, particularly in academic settings (Kabakus, Bahcekapili & Ayaz, 2023; Gie & Fenn, 2019) Frameworks like DigComp have provided structured dimensions to define digital competencies, including Information and Data Literacy (IDL), Communication and Collaboration (CC), Digital Content Creation (DCC), Safety (S), and Problem-Solving (PS) (Vuorikari, 2022). However, DigComp predominantly captures cognitive capabilities (Kellly, 2019; Spyropoulou, Tsitou, Vonitsanos, Kalantzi & Kameas, 2024) without explicitly addressing the intention and contextual acceptance factors required for actual technology use. Conversely, models like UTAUT (Venkatesh et al., 2003) and TPB (Ajzen, 1991) address motivational and behavioural aspects through Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC). Yet, they provide limited insights into the users' competence to interact with technology. The mediating role of BI has been empirically supported in various contexts, including mobile banking, e-learning, and online platforms (Chao, 2019; Ho et al., 2020). These studies demonstrated that users' cognitive perceptions influence BI, directly impacting technology adoption behaviour. However, studies rarely apply this perspective within TVET settings, where students face distinctive challenges related to infrastructure, skill diversity, and application-oriented learning.

Despite these advances, gaps remain. Prior studies mainly focus on university students in more academically oriented or technology-rich environments rather than in the Politeknik Malaysia context. TVET learners, however, represent a unique population due to their practice-based education model and heterogeneous digital readiness levels. Furthermore, few studies have operationalised the combination of DigComp and UTAUT in hierarchical models that account for HOC (reflective-reflective structures) and applied advanced modelling techniques like disjoint two-stage approaches. By addressing these gaps, this study aims to contribute theoretically by integrating DigComp, TPB, and UTAUT into a cohesive model and empirically validating the mediating role of BI in linking DLS to DTA in the TVET context.

3. Methodology

This study employs a quantitative, cross-sectional survey design, with data collected from 490 students across five distinct categories of Politeknik Malaysia, ensuring a representative sample through a stratified random two-

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stage cluster sampling technique. The research instrument is a carefully adapted questionnaire by Suparman (2022), Abbad (2021) and Silva and Morales (2022). Items from validated scales corresponding to DigComp, TPB, and UTAUT were subjected to rigorous validation processes, including expert content and face validity assessments, followed by a pilot study (n=30) confirming the reliability of the constructs (Cronbach's Alpha > 0.7). Data analysis uses Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS 4.0. A critical aspect of the analytical strategy is adopting a disjoint two-stage approach to manage and validate the type 1: reflective-reflective HOCs for DLS, BI, and DTA involving an initial assessment of the measurement models for these HOCs, evaluating indicator reliability (outer loadings of lower-order constructs), internal consistency (Composite Reliability), convergent validity (Average Variance Extracted - AVE), and discriminant validity (Fornell-Larcker criterion, Heterotrait-Monotrait ratio - HTMT). Following the confirmation of a robust measurement model, the structural model is assessed, focusing on path coefficients, their statistical significance (determined via bootstrapping), Variance Accounted For (VAF), the coefficient of determination (R^2), and effect sizes (f^2). The mediating effect of BI is specifically tested using VAF bootstrapping procedures to ascertain the significance of the indirect path from DLS through BI to DTA. Table 1 summarised the measurement model properties (loadings, CR, AVE, HTMT) and the structural model results, including direct and indirect effects, while a path diagram will visually depict the validated HOC structural model with associated parameters. The research instrument measured DLS using DigComp as the exogenous, BI constructs from TPB as the mediator, and DTA variables from UTAUT as the endogenous. Figure 1 below shows the conceptual framework of the study.

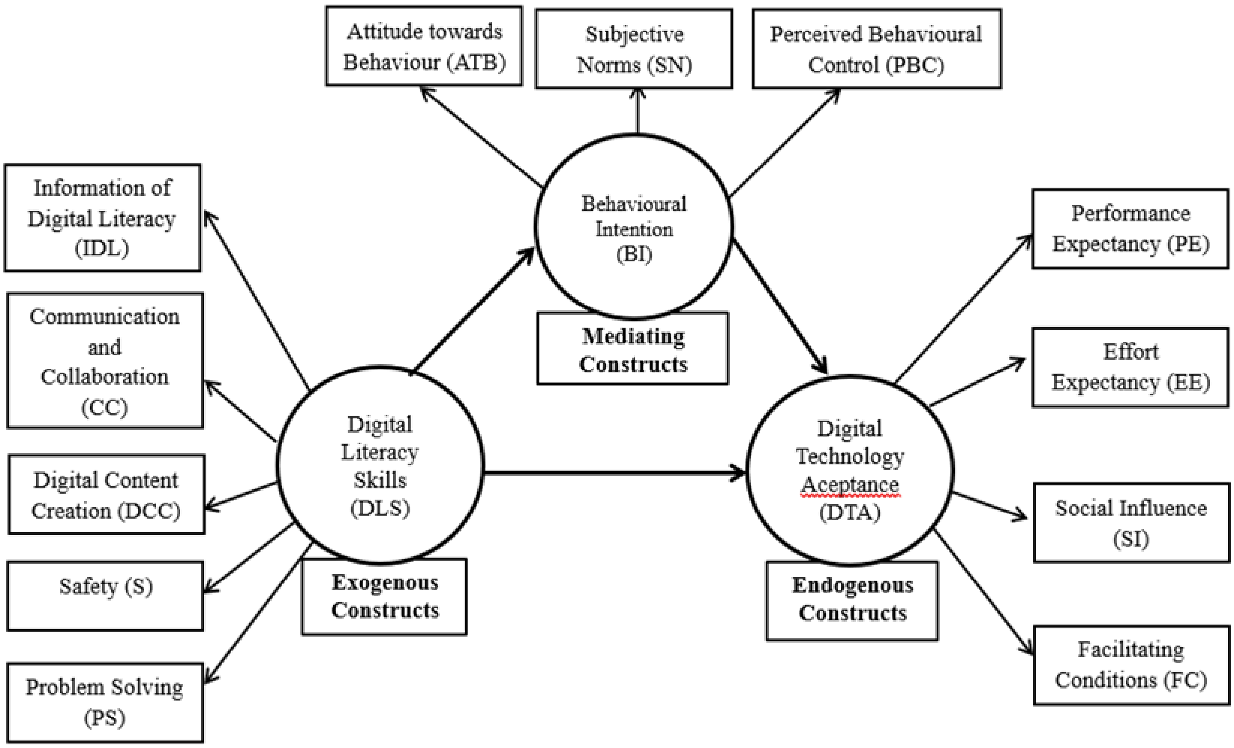

Fig. 1 *The conceptual framework of the study*

Data were analysed using PLS-SEM via SmartPLS 4.0. The hierarchical model was specified as type I reflective-reflective. The disjoint two-stage approach was implemented to handle the HOC. In Stage 1, LOCs were estimated, and their latent scores were extracted. In Stage 2, these scores were used as manifest indicators for the HOC. Preliminary analyses included normality checks through Kolmogorov-Smirnov and Shapiro-Wilk, descriptive statistics, and reliability analysis. Measurement model evaluation followed, assessing indicator reliability, internal consistency (CR), convergent validity (AVE), and discriminant validity (HTMT, Fornell-Larcker). Structural model evaluation focused on collinearity (VIF), path coefficients, Variance Accounted For (VAF), coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2).

Table 1 *Overview of reflective-reflective HOC model evaluation steps*

Step	Evaluation Criteria	Technique
Measurement Model	Outer Loading, CR, AVE, HTMT	PLS Algorithm
Structural Model	Path Coefficients, VAF, R^2, f^2, Q^2	Bootstrapping (5000 resamples)

The VAF method was employed to identify the type of mediation in this study. VAF measures the proportion of the total effect explained by the indirect effect through the mediator. According to Nitzl, Roldán, and Cepeda (2016), Lenggono et al (2023), and Ali et al (2022), the type of mediation can be classified based on the VAF value as follows: no mediation if VAF is less than 20%, partial mediation if VAF falls between 20% and 80%, and complete mediation if VAF exceeds 80%. Table 2 below displays the details of the VAF. This classification approach is widely adopted in structural equation modelling and has been supported by Hair et al. (2014), who emphasised the practical application in behavioural research. In the current study, the VAF values were calculated to assess the mediation effect of the proposed mediating variable, thereby determining whether the mediation was full, partial, or absent.

Table 2 *Variance accounted for (VAF) criteria*

Criteria	Type
VAF < 20%	No mediation
20% ≤ VAF ≤ 80%	Partial mediation
VAF > 80%	Complete mediation

4. Results

The data analysis was conducted using SmartPLS 4.0 to assess the measurement and structural models. The type 1: reflective-reflective HOC model with LOC was handled using the disjoint two-stage approach, ensuring that LOC scores were computed first and subsequently used in the HOC assessment, thus reducing model complexity and enhancing interpretability. A rigorous measurement model evaluation was conducted for both LOCs and HOCs to ensure reliability and validity before proceeding to the structural model evaluation, which involved examining indicator reliability (outer loadings), CR, AVE, Fornell-Larcker criterion and HTMT.

4.1 Measurement Model Evaluation

The assessment of the measurement model confirmed that indicator reliability, internal consistency reliability, convergent validity, and discriminant validity were well established (Table 3 and 4). All items showed acceptable outer loadings above 0.70, with Composite Reliability (CR) values exceeding the recommended threshold of 0.70, indicating adequate internal consistency. Furthermore, all constructs' Average Variance Extracted (AVE) was above 0.50, confirming convergent validity. Discriminant validity was supported by the Fornell-Larcker criterion and HTMT ratios, all below 0.90, with confidence intervals excluding the value of 1, affirming that the constructs were empirically distinct from each other.

Table 3 *Summary of measurement model assessment for Lower Order Constructs (LOCs)*

Construct	No. of Indicators	Outer Loadings Status	Composite Reliability (CR)	Average Variance Extracted (AVE)	HTMT Criterion Status
Information & Data Literacy (IDL)	4	All > 0.796 (Accepted)	0.892	0.675	HTMT<0.90, CI<1
Communication & Collab. (CC)	4	All > 0.820 (Accepted)	0.919	0.738	HTMT<0.90, CI<1
Digital Content Creation (DCC)	5	All > 0.803 (Accepted)	0.923	0.706	HTMT<0.90, CI<1
Safety (S)	5	All > 0.824 (Accepted)	0.930	0.726	HTMT<0.90, CI<1
Problem Solving (PS)	3	All > 0.813 (Accepted)	0.911	0.774	HTMT<0.90, CI<1

Construct	No. of Indicators	Outer Loadings Status	Composite Reliability (CR)	Average Variance Extracted (AVE)	HTMT Criterion Status
Attitude Towards Behaviour (ATB)	2	All > 0.922 (Accepted)	0.926	0.863	HTMT<0.90, CI<1
Subjective Norms (SN)	4	All > 0.848 (Accepted)	0.920	0.742	HTMT<0.90, CI<1
Perceived Behavioural Ctrl (PBC)	4	All > 0.825 (Accepted)	0.919	0.739	HTMT<0.90, CI<1
Performance Expectancy (PE)	2	All > 0.888 (Accepted)	0.886	0.795	HTMT<0.90, CI<1
Effort Expectancy (EE)	2	All > 0.933 (Accepted)	0.933	0.874	HTMT<0.90, CI<1
Social Influence (SI)	2	All > 0.935 (Accepted)	0.934	0.877	HTMT<0.90, CI<1
Facilitating Conditions (FC)	4	All > 0.866 (Accepted)	0.934	0.779	HTMT<0.90, CI<1

Table 4 *Summary of measurement model assessment for Higher-Order Constructs (HOCs)*

HOC Construct	Lower-Order Constructs as Indicators (Outer Loadings on HOC)	Composite Reliability (CR/rho_c)	Average Variance Extracted (AVE)	HTMT Criterion Status (between HOCs)
Digital Literacy Skills (DLS)	IDL (0.888), CC (0.879), DCC (0.905), S (0.903), PS (0.874)	0.950	0.792	HTMT<0.90, CI<1
Behavioural Intention (BI)	ATB (0.909), SN (0.945), PBC (0.913)	0.945	0.851	HTMT<0.90, CI<1
Digital Technology Acceptance (DTA)	PE (0.867), EE (0.904), SI (0.893), FC (0.935)	0.950	0.810	HTMT<0.90, CI<1

4.2 Structural Model Evaluation

The evaluation of the LOC model commenced with a collinearity assessment using the Variance Inflation Factor (VIF). All VIF values ranged between 1.537 and 3.032, well below the recommended threshold of 3.3 indicating the absence of serious multicollinearity issues among the predictor constructs, ensuring the reliability of the path coefficient estimates. Subsequently, the path coefficients (β) were analyzed through bootstrapping with 5,000 iterations to determine the strength. The results for the direct paths from DLS dimensions to DTA components showed mixed findings. While some paths, such as IDL to PE, CC to PE, EE, SI, and FC, DCC to EE, and PS to SI and FC, were statistically significant ($p < 0.05$), others were not. Similarly, for the paths from DLS dimensions to BI components, a majority indicates a significant influence of DLS on ATB, SN, and PBC. Lastly, the influence of BI components on DTA components revealed strong support, with the LOC model's coefficient of determination (R2) indicating moderate to strong explanatory power for the endogenous constructs. FC exhibited the highest R2 value of 0.684, followed by SN (0.670), EE (0.627), and ATB (0.626). These values suggest that the exogenous variables collectively explain a substantial portion of the variance in these endogenous constructs. The effect size (f2) analysis for the LOC model revealed predominantly small or negligible effects for most relationships, with a few exceptions like PS to FC and CC to FC showing slightly higher impacts, suggesting that while the constructs are reliable, their contributions to explaining the variance in endogenous variables are relatively modest. The predictive relevance (Q2 Predict) was assessed using PLSpredict, with all Q2 Predict values above zero, confirming the model's out-of-sample predictive capability. Constructs like ATB1 (0.565), SN2 (0.549), and PBC1 (0.541) demonstrated strong predictive accuracy. The VAF analysis in Table 5 showed that most LOCs demonstrated partial mediation through ATB, SN, and PBC. For example, IDL→ATB→PE (VAF = 20.93%) and IDL→ATB→EE (35.08%) indicated partial mediation despite weak direct effects. CC→ATB→PE (22.91%) and CC→ATB→EE (25.81%) also showed partial mediation. CC also mediated via SN for SI (36.1%) and EE (20.69%). S showed strong mediation. Notably, S→SN→EE, SI, and FC had VAF > 100%, indicating full mediation, meaning SN thoroughly explained the effect of S. S→ATB→PE also showed partial mediation (72.48%). PS demonstrated multiple mediation effects: PS→ATB→EE (38.64%), PS→SN→SI (46.77%), and PS→PBC→PE (>100%) indicated full mediation due to negative direct effect. PS→PBC→FC (23.08%) was partial.DCC influenced outcomes via SN and PBC. DCC→SN→SI (87.60%) showed full mediation; DCC→SN→PE, EE, FC, and DCC→PBC→PE, SI had VAFs from 26%–67%, confirming partial mediation. IDL→SN→SI also showed full mediation (VAF > 100%). In contrast, paths with low VAF (<20%) were interpreted as no mediation. Overall, SN and PBC emerged as stronger mediators than ATB, especially where direct effects were weak or negative, supporting TPB's relevance in explaining how digital skills affect technology acceptance in the presence of mediators for LOC.

Table 5 *Mediation results for Lower Order Constructs (LOC)*

Relationship	Indirect effect (β)	Direct Effect (β)	Total Effect	P-Value	VAF (%)	Mediation Type
IDL → ATB → PE	0.027	-0.102	-0.075	0.052	20.93	Partial Mediation
IDL → ATB → EE	0.020	-0.037	-0.017	0.002	35.08	Partial Mediation
CC → ATB → PE	0.041	0.138	0.179	0.047	22.91	Partial Mediation
CC → ATB → EE	0.032	0.092	0.124	0.051	25.81	Partial Mediation
CC → SN → SI	0.051	0.090	0.141	0.010	36.1	Partial Mediation
CC → SN → EE	0.024	0.092	0.116	0.002	20.69	Partial Mediation
PS → ATB → EE	0.034	0.054	0.088	0.027	38.64	Partial Mediation
S → ATB → PE	0.079	0.030	0.109	0.002	72.48	Partial Mediation
S → ATB → SI	-0.014	-0.042	-0.056	0.006	25	Partial Mediation
S → ATB → EE	0.060	0.060	-0.007	0.053	>100	Full Mediation
DCC → SN → PE	0.044	0.028	0.072	0.055	61.11	Partial Mediation
DCC → SN → EE	0.053	0.148	0.201	0.031	26.37	Partial Mediation
DCC → SN → SI	0.113	0.016	0.129	0.014	87.60	Full Mediation
DCC → SN → FC	0.076	0.102	0.178	0.017	42.70	Partial Mediation
DCC →ATB → PE	0.026	0.028	0.054	0.004	48.15	Partial Mediation
S → SN → PE	0.090	0.030	0.120	0.004	75	Partial Mediation
S → SN → EE	0.108	-0.007	0.101	0.000	>100	Full Mediation
S → SN → SI	0.233	-0.042	0.191	0.000	>100	Full Mediation
S → SN → FC	0.155	-0.020	0.135	0.000	>100	Full Mediation
PS → SN → EE	0.044	0.054	0.098	0.044	44.90	Partial Mediation
PS → SN → SI	0.094	0.107	0.201	0.009	46.77	Partial Mediation
PS → SN → FC	0.063	0.170	0.233	0.018	27.04	Partial Mediation
DCC → PBC → PE	0.057	0.028	0.085	0.045	67.05	Partial Mediation
DCC → PBC → SI	0.020	0.016	0.036	0.005	55.56	Partial Mediation
S → PBC → PE	0.082	0.030	0.112	0.002	73.21	Partial Mediation
S → PBC → EE	0.039	-0.007	0.032	0.032	>100%	Full Mediation

Relationship	Indirect effect (β)	Direct Effect (β)	Total Effect	P-Value	VAF (%)	Mediation Type
S → PBC → FC	0.036	-0.020	0.016	0.034	>100	Full Mediation
PS → PBC → PE	0.117	-0.081	0.035	0.000	>100	Full Mediation
PS → PBC → EE	0.055	0.054	0.109	0.008	50.46	Partial Mediation
PS → PBC → FC	0.051	0.170	0.221	0.021	23.08	Partial Mediation
IDL→ SN → SI	0.053	-0.025	0.028	0.000	>100	Full Mediation
PS → PBC → SI	0.041	0.107	0.148	0.009	27.70	Partial Mediation

Based on the analysis above the hypothesis H1.1 proposed that ATB significantly mediates the relationship between DLS and DTA. The results from Table 5 support this hypothesis. Specifically, significant indirect effects were found for IDL on EE through ATB (β indirect =0.020, p = 0.002), and a marginally significant indirect effect was observed for IDL on PE through ATB (β indirect =0.027, p = 0.052). Collectively, these findings indicate that ATB serves as a mediator; thus, H1.1 was accepted.Hypothesis H1.2 suggested that SI significantly mediates the relationship between DLS and DTA. Interpreting the mediator SI in the hypothesis as SN from Table 5, the analysis supports this hypothesis. A significant and fully mediated pathway was identified from IDL (DLS) to the outcome SI (BI), a component of DTA through SN as the mediator (β indirect =0.053, p = 0.000). Therefore, H1.2 was accepted under this interpretation. Hypothesis H1.3 posited that PBC significantly mediates the relationship between DLS and DTA. Upon examination of Table 5, no significant mediation paths were reported where IDL (DLS) was the independent variable and PBC was the mediator leading to any DTA-related outcome. Consequently, H1.3 was rejected. The result is shown in Table 6 below.

Table 6 *Hypothesis result for Lower Order Construct (LOC)*

Hypothesis	Statement	Result
H1.1	ATB significantly mediates the relationship between DLS and DTA among TVET students.	Accepted
H1.2	SI significantly mediates the relationship between DLS and DTA among TVET students.	Accepted
H1.3	PBC significantly mediates the relationship between DLS and DTA among TVET students.	Rejected

The mediation analysis for the HOC, as shown in Table 7, was conducted to examine the role of BI as a mediator in the relationship between DLS and DTA. The indirect effect of DLS on DTA through BI was found to be β = 0.604, with a t-value of 12.723 and a p-value < 0.001, indicating a highly significant mediating effect confirming that students with stronger digital literacy skills tend to have higher BI to adopt digital technology, which in turn leads to greater actual acceptance and usage of such technologies. With a previously established direct effect of β = 0.183 and the above indirect effect of β = 0.604, the total effect was β = 0.787. The resulting VAF value was 76.72%, which falls within the 20% to 80% threshold, indicating partial mediation (Hair et al., 2021; Nitzl et al., 2016) meaning that while BI significantly mediates the relationship between DLS and DTA, the direct path from DLS to DTA still contributes meaningfully to the outcome. In conclusion, the mediation analysis for the HOC confirms that BI partially mediates the effect of DLS on DTA, validating the theoretical assumptions of both the DigComp framework and UTAUT-TPB integration. The results support the inclusion of BI as a core mechanism in promoting DTA, suggesting that interventions to enhance DLS should also strengthen students' intentions and motivations to use digital tools. Thus, H_1 is accepted at the HOC level. Figures 2 and 3 show the path coefficient of LOC and HOC in this study.

Table 7 *Mediation and hypothesis results for Higher Order Constructs (HOC)*

Hypothesis	Relationship Path	Path Coefficient (β)	t-Value	p-Value	VAF (%)	Result/Significance
H1	DLS → BI → DTA (Indirect/Mediating Effect)	0.604	12.723	0.000	76.72	Accepted Partial Mediation.

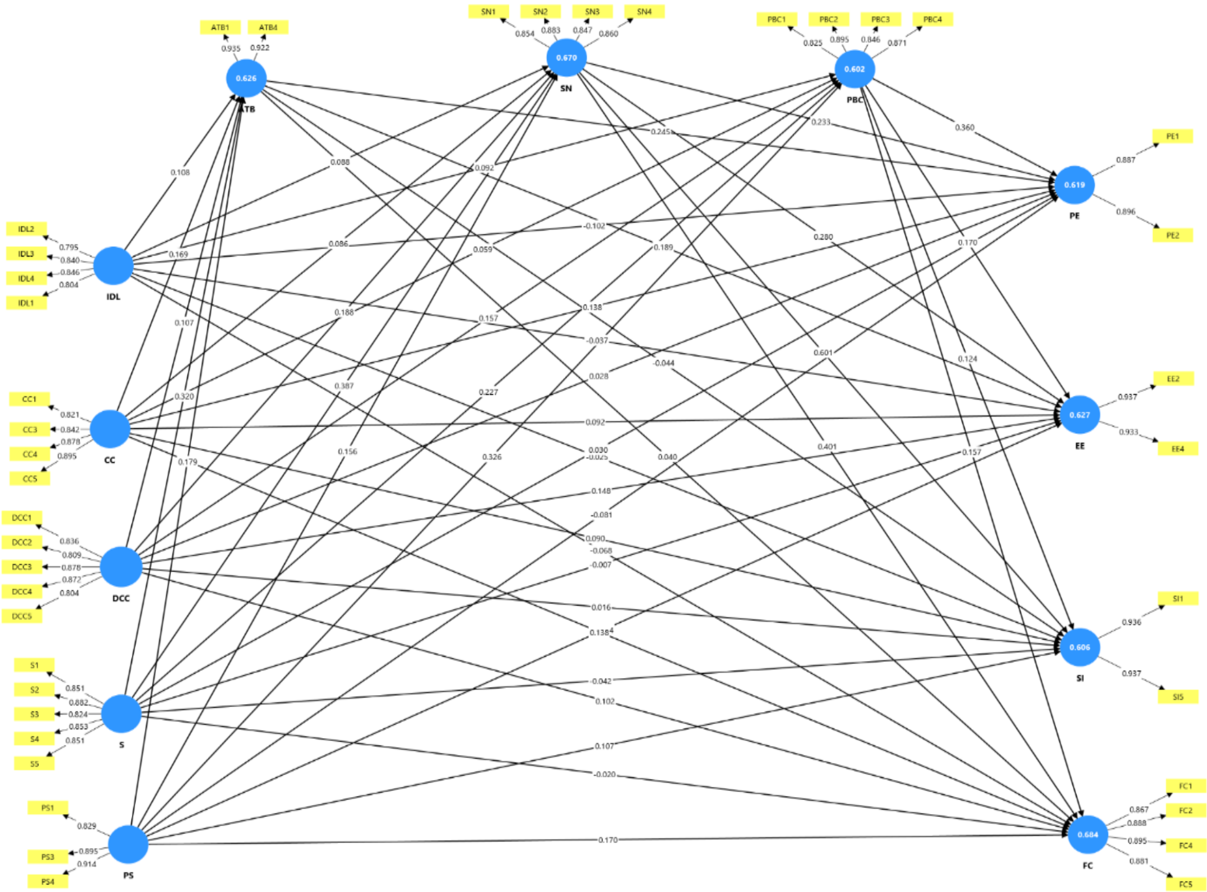

Fig. 2 *LOC path coefficients*

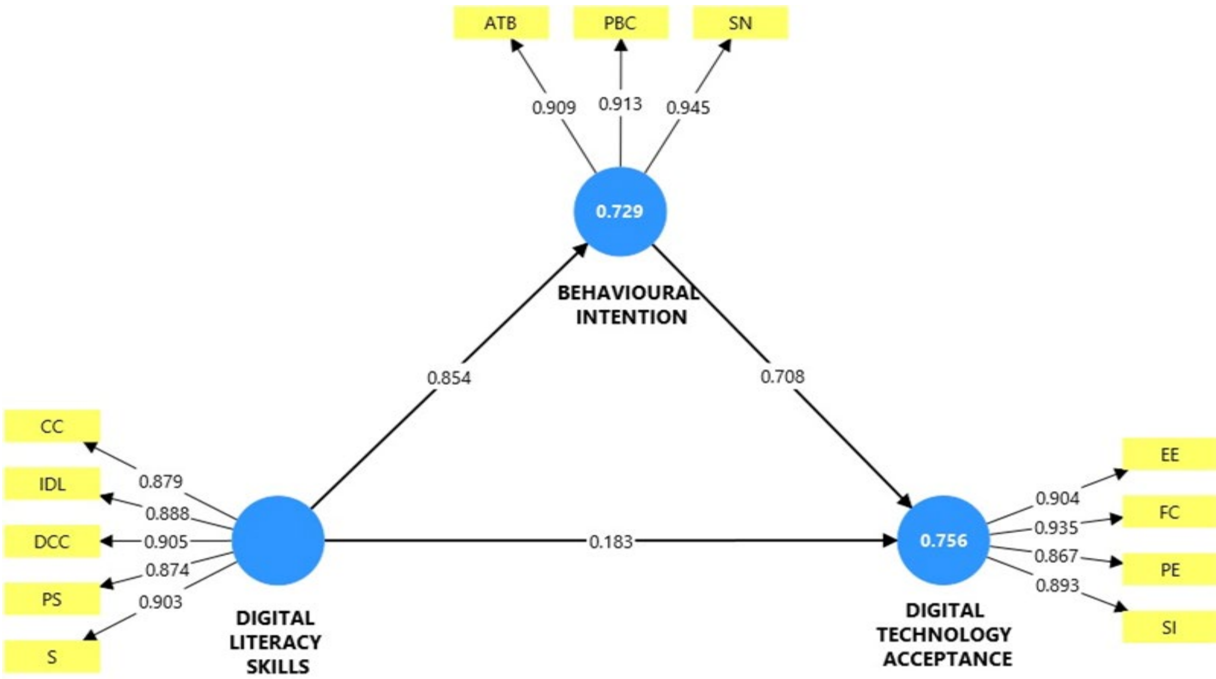

Fig. 3 *HOC path coefficients*

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5. Discussions

This study aimed to elucidate the mediating role of BI in the relationship between DLS and DTA among TVET students in Malaysia, employing a hierarchical structural model integrating DigComp, the TPB, and the UTAUT. The findings strongly support the central hypothesis that BI significantly mediates the DLS-DTA relationship, particularly when these constructs are conceptualised as HOCs. The significant partial mediation effect observed in the HOC model underscores a critical psychological pathway in technology adoption within the TVET context. This finding suggests that while possessing DLS is foundational, translating these skills into actual DTA is substantially guided by the students' intention to use such technologies aligning with established behavioural theories , which posit intention as a proximal antecedent to behaviour and acceptance as supported by studies by Unal and Uzun(2021). The DLS, conceptualised via DigComp, equips students with the necessary competencies, namely information literacy, communication and collaboration, content creation, safety, and problem-solving; however, the critical step, captured by BI, which comprises attitude, subjective norms, and perceived behavioural control, appears to be the more direct motivation for DTA. The result resonates with studies by Chao (2019) and Ho et al. (2020), which highlighted the significant role of BI in various technology adoption scenarios, although rarely with such an explicit link to a comprehensive DLS framework like DigComp within TVET.

The direct pathways within the HOC model further illuminate this dynamic. The strong positive influence of DLS on BI indicates that as students become more digitally literate, their intention to engage with digital technologies is significantly enhanced. This finding is parallel to the findings by Jang, Aavakare, Nikou and Kim (2021) also Sadaf and Gezer (2020). Logically, increased competence likely boosts self-efficacy, one of the components of PBC within BI and the perceived usefulness of the technologies influencing ATB. Concurrently, the direct positive influence of BI on DTA reinforces the core belief of intention-based theories: a stronger intention directly translates into higher acceptance. DLS's remaining significant direct effect on DTA, confirming partial mediation, suggests that DLS also has some direct bearing on acceptance, independent of intention attributing to the fact that higher skills might inherently make technological interaction smoother and more effective, leading to de facto acceptance even if the conscious intention is not the sole factor.

At the LOC level, the analysis revealed a complex web of partial mediations, where specific dimensions of DLS influenced particular aspects of DTA through distinct components of BI. For instance, S's skill influencing various DTA components via SN suggests that perceived safety in using technology, when reinforced by social expectations, strongly impacts how students view the social implications of using such technologies. While the HOC model offers a more parsimonious and overarching understanding, these LOC-level insights highlight specific leverage points for targeted interventions to enhance particular skills or address specific intentional barriers.C The current study's validation of an integrated model, particularly the HOC reflective-reflective structure using a disjoint two-stage PLS-SEM approach, aligns with contemporary methodological recommendations (Sarstedt et al., 2019; Hair et al., 2022) and contributes to the methodological rigour in educational technology research. This research extends the application of DigComp beyond mere competency assessment into predictive behavioural modelling and provides a specific, validated instrument for the Malaysian TVET context, addressing a notable gap highlighted by the limited focus on TVET students in the broader DTA literature.

6. Conclusion

The role of BI in the relationship between DLS and DTA among TVET students in Malaysia is essential for digital learning. The findings definitively establish that BI significantly and partially mediates the impact of DLS on DTA, highlighting that students' intentions are a critical conduit through which their digital competencies translate into the acceptance of technology. Theoretically, this research contributes by effectively integrating three robust frameworks, DigComp, TPB, and UTAUT, into a cohesive hierarchical model that captures the competency-based aspects of DLS and the psycho-behavioural dimensions of intention and acceptance. The empirical validation of this integrated model, particularly the demonstration of BI's mediating function, enriches the existing literature on technology adoption by providing a nuanced understanding specific to the TVET domain, an area previously underexplored. Methodologically, applying and validating a Type I reflective-reflective HOC model using a disjoint two-stage PLS-SEM approach also offers a robust model for future research on complex, multi-dimensional constructs in educational technology.

Despite the contributions, this study acknowledges certain limitations. A cross-sectional design restricts the ability to infer causality definitively; longitudinal studies could track the development of DLS, BI, and DTA over time. Furthermore, the reliance on self-reported data may be subject to common method bias, and the findings are specific to the Malaysian Politeknik context, which may limit generalizability to other TVET systems or cultural settings.

Future research could build upon these findings by conducting longitudinal or experimental studies to establish causality more firmly and test the efficacy of interventions designed to enhance DLS and BI. Exploring the role of additional moderators, such as institutional support, pedagogical approaches, socioeconomic background, or other mediating variables, could provide an even more comprehensive understanding of DTA. In conclusion, this study affirms that fostering BI is critical to leveraging DLS for greater DTA in TVET. By understanding and addressing both the skills and the will, educational stakeholders can better prepare students to thrive in an increasingly digitalised world.

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Conflict of Interest

The authors declare there are no conflicts of interest related to this article's research, authorship, or publication

Author Contribution

Conceptualised the study, developed the methodology, conducted data collection and analysis, led the writing of the original draft and reviewed and edited subsequent versions: *Kamilah Zainuddin.* ***Supervised the research process, provided critical guidance on the study design, and contributed to the refinement of the manuscript through expert feedback and critical revisions:*** *Khairul Azhar Mat Daud.* ***Provided additional supervision, contributed to the theoretical framework and research methodology, and offered significant input during the manuscript review and editing process:*** *Yus Heary Mahmud. All authors have read and approved the final manuscript.*

References

Abbad, M. M. M. (2021). Using the UTAUT model to understand students' usage of e-learning systems in developing countries. Education and Information Technologies, 26(6), 7205–7224. https://doi.org/10.1007/s10639-021-10573-5

Ajzen, I. (1991). The theory of planned behavior. Organisational Behavior and Human Decision Processes, 50(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Alakrash, H. M., & Abdul Razak, N. (2021). Technology-based language learning: Investigation of digital technology and digital literacy. Sustainability, 13(21), 12304. https://doi.org/10.3390/su132112304

Ali, A., Abbas, S. F., Khattak, M. S., Arfeen, M. I., Ishaque Chaudhary, M. A., & Yousaf, L. (2022). Mediating role of employees' intrinsic motivation and psychological safety in the relationship between abusive supervision and innovative behavior: An empirical test in IT sector of Pakistan. Cogent Business & Management, 9(1), 2039087. https://doi.org/10.1080/23311975.2022.2039087

Antonietti, C., Cattaneo, A., & Amenduni, F. (2022). Can teachers' digital competence influence technology acceptance in vocational education? Computers in Human Behavior, 132, 107266. https://doi.org/10.1016/j.chb.2022.107266

Becker, J. M., Klein, K., & Wetzels, M. (2012). Hierarchical latent variable models in PLS-SEM: Guidelines for using reflective-formative type models. Long Range Planning, 45(5-6), 359–394. https://doi.org/10.1016/j.lrp.2012.10.001

Carretero, S., Vuorikari, R., & Punie, Y. (2017). DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use. Publications Office of the European Union. https://doi.org/10.2760/38842

Chao, C. M. (2019). Factors determining the behavioral intention to use mobile learning: An application and extension of the UTAUT model. Frontiers in psychology, 10, 1652.Volume 10 – 2019, https://doi.org/10.3389/fpsyg.2019.01652

Charles, A. Y., Amoah-Sei, E., Razak, B. N., & Dissou, P. Y. A. (2024). Technology Acceptance and Employability in TVET Graduates.Research Square; 2024. https://doi.org/10.21203/rs.3.rs-4230765/v1

Chiu, T. K., Sun, J. C. Y., & Ismailov, M. (2022). Investigating the relationship of technology learning support to digital literacy from the perspective of self-determination theory. Educational Psychology, 42(10), 1263-1282. https://doi.org/10.1080/01443410.2022.2074966

Gaber, S. A., Shahat, H. A., Alkhateeb, I. A., Al Hasan, S. A., Alqatam, M. A., Almughyirah, S. M., & keshar Kamel, M. (2023). Faculty members' awareness of artificial intelligence and its relationship to technology acceptance and digital competencies at King Faisal University. International Journal of Learning, Teaching and Educational Research, 22(7), 473-496. https://doi.org/10.26803/ijlter.22.7.25

Gie, T. A., & Fenn, C. J. (2019). Technology acceptance model and digital literacy of first-year students in a private institution of higher learning in Malaysia. BERJAYA Journal of Services & Management, 11, 103-116.

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Hair, J. F., Howard, M. C., & Nitzl, C. (2022). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. Journal of Business Research, 109, 101–110. https://doi.org/10.1016/j.jbusres.2019.11.069

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2014). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). SAGE Publications.

Hammoda, B., & Foli, S. (2024). A digital competence framework for learners (DCFL): A conceptual framework for digital literacy. Knowledge Management & E-Learning, 16(3), 477–500. https://doi.org/10.34105/j.kmel.2024.16.022

Ho, J. C., Wu, C. G., Lee, C. S., & Pham, T. T. T. (2020). Factors affecting the behavioral intention to adopt mobile banking: An international comparison. Technology in Society, 63, 101360. https://doi.org/10.1016/j.techsoc.2020.101360

Jang, M., Aavakare, M., Nikou, S., & Kim, S. (2021). The impact of literacy on intention to use digital technology for learning: A comparative study of Korea and Finland. Telecommunications Policy, 45(7), 102154.

Kabakus, A. K., Bahcekapili, E., & Ayaz, A. (2023). The effect of digital literacy on technology acceptance: An evaluation on administrative staff in higher education. Journal of Information Science, DOI: https://doi.org/10.1177/01655515231160028

Kelly, M. B. (2019). The DigComp Deficit: A Qualitative Exploration into the Experiences and Perceptions around Digital Competence in Ireland's 'second-chance'Adult & Community Education Sector (Doctoral dissertation, Dublin, National College of Ireland).

Kuntadi, I., A, A., Rohendi, D., Suryadi, D. ., Ab Halim, F., Ramdani Sari, A., Muktiarni, & Dwiyanti, V. (2022). Towards Digital TVET: A Comparative Study on Students' Readiness in The Industry Digital Demands in Indonesia and Malaysia. Journal of Technical Education and Training, 14(3), 79-93. https://penerbit.uthm.edu.my/ojs/index.php/JTET/article/view/12898

Lenggono, K. A., Qomariyatus, S., Gatot, C., Sri, A., Patria, D. K. A., & Adi, S. (2023). Discipline as complete mediation in the implementation of the Theory Planned Behaviour of nurse's handwashing compliance. Med J Malaysia, 78(3), 296-300.

Md Hani, M. H. ., Affero Ismail, Siti Soleha Razali, M. Nizan Abu Bakar, Nur Liyana Rosman, Nuqman Nasir, & Zawawi Mohamad. (2024). The Development of Digital Competence Model Among TVET Educators Towards Digitization: A Concept Paper. Journal of TVET and Technology Review, 2(1), 1-18. https://penerbit.uthm.edu.my/ojs/index.php/jttr/article/view/18112

Nitzl, C., Roldán, J. L., & Cepeda, G. (2016). Mediation analyses in Partial Least Squares Structural Equation Modeling: Guidelines and empirical examples. In Partial Least Squares Path Modeling (pp. 173–195). Springer. https://doi.org/10.1007/978-3-319-64069-3_8

Rafi, M., JianMing, Z. and Ahmad, K. (2019), "Technology integration for students' information and digital literacy education in academic libraries", Information Discovery and Delivery, Vol. 47 No. 4, pp. 203-217. https://doi.org/10.1108/IDD-07-2019-0049

Rahim, Z. A., & Iqbal, M. S.(2025) Bridging Digital Gaps: A Framework to Enhance Digital Economy Competences in Malaysia.Journal of Advanced Research in Applied Sciences and Engineering Technology 64(2):219-238.DOI: https://doi.org/10.37934/araset.64.2.219238

Sadaf, A., & Gezer, T. (2020). Exploring factors that influence teachers' intentions to integrate digital literacy using the decomposed theory of planned behavior. Journal of Digital Learning in Teacher Education, 36(2), 124-145.

Sánchez, A., Woo, R. M., Salas, R. C., López, F., Narvaez, E. G., Lagunes, A., & Torres, C. A. (2022). Development of digital competence for research. Applied System Innovation, 5(4), 77. https://doi.org/10.3390/asi5040077

Sarstedt, M., Hair Jr, J. F., Cheah, J. H., Becker, J. M., & Ringle, C. M. (2019). How to specify, estimate, and validate higher-order constructs in PLS-SEM. Australasian Marketing Journal (AMJ), 27(3), 197–211. https://doi.org/10.1016/j.ausmj.2019.05.003

Scherer, R., Siddiq, F., & Teo, T. (2019). Becoming more specific: Measuring and modeling teachers' perceived usefulness of ICT in the context of teaching and learning. Computers & Education, 136, 1–12. https://doi.org/10.1016/j.compedu.2019.03.011

Silva-Quiroz, J., Morales-Morgado, E.M (2022). Assessing digital competence and its relationship with the socioeconomic level of Chilean university students. Int J Educ Technol High Educ 19, 46. https://doi.org/10.1186/s41239-022-00346-6

Spyropoulou, N., Tsitou, S., Vonitsanos, G., Kalantzi, R., & Kameas, A. (2024). Digital Transformation in Adult Education: Empowering Educators to Use DigComp with a MOOC. In 2024 IEEE Frontiers in Education Conference (FIE) (pp. 1-9). IEEE. doi: https://doi.org/10.1109/FIE61694.2024.10892973.

Statti, A., & Torres, K. M. (2020). Digital literacy: The need for technology integration and its impact on learning and engagement in community school environments. Peabody Journal of Education, 95(1), 90–100. https://doi.org/10.1080/0161956X.2019.1702426

Suparman, I. (2023). Factors Determining The Behavioral Intention To Use Online Learning For English Language Learning Among Polytechnic Students (Doctoral dissertation).

Suryawidjaja, V. (2023). Digital literacy and growth mindset to predict technology acceptance during learning processes. Psikodimensia: Kajian Ilmiah Psikologi, 22(1), 77-82. DOI: https://doi.org/10.24167/psidim.v22i1.4937

Teo, T., Zhou, M., Fan, A., & Huang, F. (2019). Factors that influence university students' intention to use Moodle: A study in Macau. Educational Technology Research and Development, 67(3), 749–766. https://doi.org/10.1007/s11423-018-9620-7

Unal, E., & Uzun, A. M. (2021). Understanding university students' behavioral intention to use Edmodo through the lens of an extended technology acceptance model. British Journal of Educational Technology, 52(2), 619-637.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478. https://doi.org/10.2307/30036540

Vo, T. T., & Vansteelandt, S. (2022). Challenges in systematic reviews and meta-analyses of mediation analyses. American Journal of Epidemiology, Volume 191, Issue 6, June 2022, Pages 1098–1106, https://doi.org/10.1093/aje/kwac028

Vuorikari, R. (2022). DigComp Helping Shape the Education Ecosystem in Europe. In: Väljataga, T., Laanpere, M. (eds) Shaping the Digital Transformation of the Education Ecosystem in Europe. EDEN 2022. Communications in Computer and Information Science, vol 1639. Springer, Cham. https://doi.org/10.1007/978-3-031-20518-7_11

Vuorikari, R., Kluzer, S., & Punie, Y. (2022). DigComp 2.2: The Digital Competence Framework for Citizens–With new examples of knowledge, skills, and attitudes. Publications Office of the European Union. https://doi.org/10.2760/115376

Yang, X., & Wu, W. (2024). Advancing digital transformation in TVET through international cooperation: Approaches by the UNESCO Chair on Digitalization in TVET. Vocation, Technology & Education, 1(2). https://doi.org/10.54844/vte.2024.0585