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Integrating Heutagogy Principles and Technology in Malaysian Higher Education: Enhancing Student-centred Language Learning Practices

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Abstract

This study examines how heutagogy (self-determined learning) can be integrated with educational technology to strengthen student-centred language learning in Malaysian higher education. Heutagogy emphasizes learner autonomy, critical reflection, and capability development, while technology enables interactive, flexible, and personalized learning experiences. This research identifies four key factors learner autonomy, technology integration, reflective practice, and institutional support that influence effective heutagogy learning. A quantitative cross-sectional survey involving 200 undergraduates from public and private universities was conducted using a validated questionnaire. Results show that technology integration and learner autonomy are the strongest predictors of enhanced learning practices, with technology integration being the most influential ($\beta = 0.39$, $p < 0.001$), followed by learner autonomy ($\beta = 0.35$, $p < 0.001$). All factors were significantly correlated with enhanced learning ($p < 0.01$), explaining 67% of the total variance. While the findings provide valuable insights, the study's reliance on self-reported perceptions and its cross-sectional design limit causal interpretation and generalizability. Overall, the results highlight the transformative potential of combining heutagogy with digital tools to cultivate autonomous, reflective, and future-ready learners. The study offers practical guidance for educators and policymakers seeking to align digital-age language learning with Malaysia's higher education reform agenda.

Keywords: Heutagogy, Higher Education, Language Learning, Malaysia, Self-Determined Learning, Technology Integration.

Introduction

The transformation of higher education in Malaysia is central to the nation's goal of developing a competitive, knowledge-driven workforce. As emphasized in the Malaysia Education Blueprint 2015–2025 (Higher Education), universities are expected to nurture creativity, critical thinking, and lifelong learning to meet the demands of an increasingly complex global landscape (1, 2). Language learning plays an important role in supporting students' academic achievement and global engagement (3, 4). Yet, despite ongoing educational reform and rapid digital expansion, Malaysian higher education institutions still struggle to fully adopt student-centred, capability-driven teaching approaches. This gap necessitates a closer evaluation of how current practices align with national aspirations.

A major issue lies in the persistent mismatch between policy aspirations and actual classroom practices. Although the Blueprint advocates learner-centred education, many universities continue to rely on traditional, teacher-led pedagogies characterized by rigid curricula and exam-oriented assessment. Such approaches restrict student autonomy, limit opportunities for critical reflection, and hinder the development of essential 21st-century learning competencies. Similarly, although digital technologies are widely introduced, they are often used merely as channels for content delivery rather than as tools that empower learners to self-direct, collaborate, and engage meaningfully. This disconnect highlights the need for pedagogical frameworks that genuinely promote agency, reflection, and independent capability development.

Heutagogy, or self-determined learning, offers a comprehensive framework for addressing these challenges. Grounded in learner autonomy, capability development, and critical reflection (5–7), heutagogy shifts the educational paradigm from teacher-centred instruction to learner-driven growth. When combined with digital tools such as

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Learning Management Systems, AI-powered platforms, and online collaborative environments, heutagogy can support flexible, adaptive, and personalized learning experiences (8). This synergy fosters metacognitive development, strengthens learner ownership, and helps overcome long-standing pedagogical gaps in Malaysian higher education.

Despite global interest in heutagogy, empirical research on its implementation within Malaysia particularly in relation to technology-enhanced language learning remains limited. Existing studies often examine pedagogy and technology separately, overlooking their combined potential to promote autonomy, engagement, and reflective learning (9, 10). Furthermore, issues such as uneven digital readiness, varying lecturer competency, and institutional constraints continue to impede the adoption of learner-driven, technology-rich practices (2). These realities underscore the need for evidence-based insights on heutagogy–technology integration in Malaysia's developing higher education landscape.

To address this gap, the present study investigates how integrating heutagogy principles with educational technology can enhance undergraduate language learning in Malaysian universities. Specifically, the study examines the effects of learner autonomy, technology integration, reflective practice, and institutional support on enhanced learning practices. Based on these aims, the following hypotheses were developed:

H1: Learner autonomy has a significant positive effect on enhanced learning practices.

H2: Technology integration has a significant positive effect on enhanced learning practices.

H3: Reflective practice has a significant positive effect on enhanced learning practices.

H4: Institutional support has a significant positive effect on enhanced learning practices.

Heutagogy: From Pedagogy to Self-Determined Learning

Heutagogy, a concept extending beyond both pedagogy and andragogy, emphasizes learner agency and self-determined learning. It positions learners as active decision-makers who set goals, regulate their progress, and evaluate their learning processes, thereby enabling deeper and more autonomous engagement. Central to heutagogy is double-loop learning, in which learners not only acquire knowledge but also critically examine the values, assumptions, and strategies underpinning their learning (11, 12). This approach aligns closely with modern educational goals that prioritize adaptability, critical thinking, and lifelong learning competencies essential in navigating today's rapidly evolving global environment (6, 13).

Beyond practical techniques, heutagogy is supported by strong theoretical foundations that position it as a transformative educational paradigm. Heutagogy aligns with a widely established motivational framework in which autonomy, competence, and relatedness are identified as core psychological needs that support intrinsic motivation (11). From this perspective, learners act as autonomous agents who continuously interact with complex systems.

Heutagogy aligns with a widely established motivational framework in which autonomy, competence, and relatedness are identified as core psychological needs that support intrinsic motivation (11). In addition, heutagogy resonates with capability theory, which emphasizes the development of learners who can make informed decisions, adapt to novel situations, and act effectively in unfamiliar contexts (5, 6). The integration of double-loop learning further supports this development, enabling learners to reflect deeply on their assumptions and transform their understanding at a fundamental level (6, 7).

These theoretical underpinnings highlight that heutagogy is more than a set of learner-centred techniques it is a comprehensive framework designed to develop autonomous, reflective, and capable individuals prepared for the demands of lifelong learning in complex environments (13).

Heutagogy aligns closely with several well-established perspectives in Second Language Acquisition, thereby strengthening its relevance to language learning contexts. Language development has been shown to occur most effectively when learners are exposed to comprehensible input that extends slightly beyond their current proficiency level, a process that is supported when learners are allowed to select learning resources that match their evolving needs within a self-determined learning environment (14, 15). Meaningful language production has also been identified as a critical catalyst for cognitive processing, and heutagogy naturally facilitates

such output through learner-designed projects and multimodal learning tasks that encourage active language use and reflection (14, 15).

Sociocultural perspectives further support the principles of heutagogy by emphasizing collaborative learning, peer interaction, and scaffolded problem-solving processes. Learning within guided developmental spaces has been shown to align with heutagogy's emphasis on collaborative meaning-making and negotiated learning experiences. In addition, the importance of negotiating meaning through interaction has been widely recognized, particularly in contexts where learners are given greater agency over communicative environments and learning tools, thereby strengthening self-determined language learning processes.

A growing body of research has demonstrated that heutagogy enhances learner motivation, engagement, and metacognitive awareness, which in turn contributes to improved language proficiency and cultural competence (14, 15). However, much of the existing empirical evidence has been generated in Western educational contexts where heutagogy practices are more firmly established. This reveals a significant research gap in developing contexts such as Malaysia, where teacher-centred instructional approaches continue to dominate language education (10, 16). Recent studies have further emphasized that heutagogy is particularly timely, as it provides a robust framework for cultivating self-determined learners who are capable of navigating complex, technology-rich learning environments and adapting to future workforce demands (7).

Technology as an Enabler for Heutagogy in Language Education

Technology has emerged as a critical enabler of heutagogical learning, particularly in language education. Digital tools such as Learning Management Systems, mobile-assisted applications, AI-driven platforms, and online collaborative environments offer learners the flexibility to self-direct their learning paths, a core requirement of heutagogy. When used strategically, technology supports personalized learning, enhances engagement, and promotes capability development by enabling learners to regulate their pace, select resources, and design meaningful learning activities.

Existing research consistently highlights the potential of educational technologies to facilitate self-determined learning. AI-based language tutors, for example, provide real-time feedback, adaptive learning pathways, and data-driven insights that allow learners to monitor progress and refine strategies (17, 18). Virtual exchange environments further provide authentic communicative opportunities that strengthen linguistic, cultural, and digital competencies (19). These tools not only enhance access to diverse resources but also empower learners to take ownership of their learning processes.

However, much of the literature on technology integration examines digital tools in isolation, without considering how they intersect with heutagogy principles. Many studies focus on the role of LMS platforms or mobile applications in improving engagement or academic performance, yet seldom address how technology can deepen learner agency, support self-regulation, or enhance reflective practice elements that lie at the heart of heutagogy. This limitation reflects a persistent gap in understanding how technology can be intentionally designed or adopted to promote self-determined learning environments.

Research on technology integration in Malaysia also presents mixed outcomes. While some universities have successfully expanded digital adoption, others continue to struggle with infrastructural limitations, inconsistent access, lecturer readiness, and gaps in institutional support (20, 21). These challenges highlight the need for a more holistic approach that considers not only technological tools but also the pedagogical paradigms that guide their use. Successful integration requires an environment in which technology and pedagogy work synergistically to expand learner choice, facilitate reflection, and nurture autonomous learning behaviours.

International frameworks such as the European Framework for the Digital Competence of Educators underscore the critical role of educators in leveraging technology effectively. These frameworks emphasize that digital tools must not merely deliver content but should empower students to inquire, collaborate, and create core elements of heutagogy. For Malaysia, aligning technology adoption with heutagogy principles offers a promising pathway to bridge the gap

between policy aspirations and classroom realities, enabling more meaningful, flexible, and future-relevant language learning experiences.

The Malaysian Context: Policy, Readiness, and Challenges

Malaysia's higher education sector is undergoing a critical period of digital transformation, guided by national frameworks such as the Malaysia Education Blueprint 2015–2025 (Higher Education) and the Digital Education Policy. Both emphasize the need to create innovative, technology-enhanced, and student-centred learning environments. However, despite clear policy aspirations, the actual adoption of heutagogy and other learner-driven pedagogies remains uneven. This persistent misalignment between national vision and classroom implementation has been widely reported in recent studies.

A major challenge concerns disparities in digital infrastructure across institutions (22–25). While some well-established universities have sufficient facilities, many others continue to struggle with unstable internet connectivity, inadequate hardware, and limited access to digital tools. These infrastructural gaps restrict the implementation of pedagogical approaches that rely heavily on technology, including heutagogy.

Lecturer readiness and pedagogical competency also present significant obstacles. Although national policies call for the integration of technology and student-centred approaches, many educators feel underprepared to apply digital pedagogy effectively (21, 26). This is compounded by the deep-rooted prevalence of traditional, teacher-directed instructional practices in Malaysian higher education (27, 28). Such practices limit opportunities for learner autonomy, critical reflection, and meaningful technology-mediated engagement all of which are foundational to heutagogy.

These challenges mirror those found in many developing countries, where systemic constraints slow the implementation of educational innovations (25, 29). Malaysia presents a distinctive paradox: national policies strongly advocate for progressive pedagogical models, yet the transition to heutagogy, technology-enabled practices in teaching and learning remains slow and inconsistent.

Within this context, integrating heutagogy with technology presents a timely and powerful opportunity. When implemented together, they can transform language learning into a more flexible, autonomous, and engaging experience. However, this transformation requires more than simply acquiring digital tools. It demands a supportive ecosystem that includes robust infrastructure, well-trained educators, institutional policies that encourage innovation, and a culture that values learner agency.

Although Malaysia has established a solid policy foundation for digital and student-centred learning, the actualization of heutagogy-enhanced language education continues to face challenges related to readiness, capability, and systemic support. Addressing these gaps is essential to align institutional practices with national aspirations and to empower Malaysian learners to thrive within an increasingly complex and technology-driven global landscape (20, 30).

Connecting to Global Trends: Heutagogy and Technology in a Global Context

Globally, higher education systems are shifting toward learner-centred paradigms that emphasize autonomy, adaptability, critical thinking, and lifelong learning competencies that are increasingly essential in a rapidly evolving knowledge economy (13, 31). Heutagogy aligns strongly with these international priorities, positioning learners as active agents capable of directing their own learning pathways, reflecting deeply on their decisions, and developing the capabilities required to navigate complex and uncertain environments (6, 7, 32).

Parallel to these pedagogical developments, digital transformation has become a defining feature of contemporary education. Educational technologies ranging from AI-driven language tutors to immersive virtual learning environments are now embedded within the teaching and learning ecosystems of technologically advanced countries (33, 34). In contexts with strong digital infrastructure such as Finland, Singapore, and the United States, these tools are deliberately integrated to complement heutagogy principles, facilitating personalized, flexible, and self-directed learning experiences that empower students to take ownership of their academic progress (35, 36). Such practices illustrate how technology can

operationalize the core elements of heutagogy by expanding learner choice, enabling real-time feedback, and supporting collaborative knowledge construction.

However, the extent to which heutagogy and technology have been harmoniously integrated remains uneven across the globe. Many countries continue to grapple with infrastructural disparities, variable levels of digital competence among educators, and entrenched teacher-centred pedagogical traditions. These global challenges mirror those faced in Malaysia, where strong policy aspirations exist, yet systemic constraints limit consistent implementation across higher education institutions.

The present study situates Malaysia within this broader international discourse by examining how the synergy between heutagogy and technology can be leveraged to enhance language learning. The insights generated extend beyond the Malaysian context, offering relevance to other developing nations undertaking similar educational reforms but encountering difficulties in operationalizing student-centred, technology-enabled pedagogies in practice.

Synthesizing the Gaps and the Present Study

A synthesis of existing literature reveals a significant gap in empirical research that examines the combined influence of heutagogy and technology on language learning, particularly within the Malaysian higher education context. While Western studies have explored both constructs independently, there is limited research investigating how they intersect to create a cohesive, capability-oriented learning environment in developing nations, where unique socio-cultural norms and institutional constraints shape pedagogical practices. Moreover, although technology integration has been widely studied, few investigations explicitly connect digital tools with the core principles of heutagogy, especially in language education settings.

To address this gap, the present study explores how the integration of heutagogy principles and educational technologies can enhance student-centred language learning practices in Malaysian higher education. By examining this intersection, the study contributes to a deeper understanding of how self-determined learning frameworks can be effectively implemented in diverse educational systems beyond Western contexts.

Specifically, this research investigates the role of mobile-heutagogy practices, which naturally merge digital affordances with learner autonomy, in fostering student engagement, interest, and confidence in language learning (10, 37). The study also assesses how these practices align with established pedagogical theories, thereby linking conceptual frameworks with practical classroom realities. This examination is timely given the rising attention on AI-enabled learning tools and their potential to support personalized, adaptive, and reflective language learning experiences (38).

Overall, the study responds to growing international calls for student-centred, technology-enhanced pedagogical models that empower learners, promote reflective engagement, and move beyond traditional teacher-centred methods that are increasingly inadequate for addressing 21st-century educational challenges.

Methodology

This study employed a quantitative research design utilizing a cross-sectional survey method to investigate the relationships between heutagogy principles, technology integration, and language learning practices among Malaysian undergraduates. This approach is widely used in social science research for examining variables at a single point in time and is aligned with methodological recommendations (39).

A quantitative cross-sectional survey design was selected because it enables the systematic examination of relationships between multiple latent variables learner autonomy, technology integration, reflective practice, and institutional support across a large and diverse student population. This approach is well-suited for studies aiming to identify predictive factors and test hypothesized associations using validated measurement scales. Furthermore, quantitative designs allow for statistical generalization of findings, providing empirical evidence of how heutagogy-related constructs influence language learning practices in real institutional contexts. Given the objective of this study to measure behavioural, perceptual, and contextual variables at a single point in time, the cross-sectional survey

method offers a rigorous and efficient methodological fit.

Participants and Sampling Procedure

The target population comprised undergraduate students enrolled in public and private universities in Malaysia who were taking credit-bearing language courses (e.g., English for Professional Communication, Mandarin, Arabic). To ensure transparency, representativeness, and validity, this study adopted a stratified random sampling strategy.

Two strata were created based on university type (public vs. private) to reflect the national enrolment distribution. Using institutional student records, proportional allocation was determined for each stratum to avoid over- or under-representation. Within each stratum, course coordinators provided randomized enrolment lists of students taking language courses. Participants were then selected using a computer-generated random number method, ensuring that every eligible student had an equal probability of inclusion and reducing sampling bias.

The survey link was distributed through course coordinators, and participation was voluntary, with no incentives offered to avoid coercion. A final sample of N = 200 was collected, exceeding the minimum number required by power analysis (40–42). This transparent and structured sampling approach enhances internal validity and minimizes threats to accuracy.

Sample Size Determination

G*Power software was used to calculate the minimum required sample size for multiple regression analysis with four predictors. Based on a medium effect size ($f^2 = 0.15$), alpha = 0.05, and desired power of 0.95, the minimum sample required was 129 participants (40–42). The final sample of 200 participants therefore strengthens generalizability and statistical power.

Research Instrument

Data were collected using a structured, self-administered online questionnaire. The instrument was developed by adapting well-established measurement scales from prior studies to suit the specific context of this research (6, 43–45). A pilot study involving 30 students was conducted to assess the clarity, reliability, and validity of the questionnaire items. Based on the pilot findings, minor wording adjustments were made before final administration. All constructs were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The questionnaire comprised two main sections. The first section collected demographic information, including participants' age, gender, university type, year of study, and field of study. The second section consisted of 25 items measuring five key constructs relevant to the study. Learner autonomy was measured using items adapted from previously validated instruments (6, 43). Technology integration was assessed using items derived from established technology acceptance and integration scales (44, 45). Reflective practice items were developed based on existing theoretical and empirical work on self-determination and reflective learning processes (46, 47). Institutional support was measured using items adapted from scales assessing perceived organizational support (48–50). Enhanced learning practices were assessed using items adapted from prior studies examining student engagement and learning effectiveness (51–53).

This instrument design ensures a systematic and rigorous examination of the study variables and aligns with best practices in quantitative research within the social sciences.

Data Sources and Reliability

All data used in this study were derived from primary sources, obtained through a structured online questionnaire completed by undergraduate students from Malaysian public and private universities. The use of primary data ensures that the results directly reflect authentic learner perceptions, rather than relying on secondary institutional reports or publicly available datasets. Several measures were implemented to strengthen data reliability. First, all questionnaire items were adapted from well-established and validated instruments ensuring strong construct validity (43–53). Second, a pilot test involving 30 students was conducted to assess item clarity, internal consistency, and technical functionality of the survey platform. Third, the final instrument demonstrated excellent internal reliability, with Cronbach's alpha coefficients ranging from 0.84 to 0.89, exceeding the recommended threshold for behavioural research. Additionally, the stratified random sampling procedure and secure online administration minimized potential biases,

thereby enhancing the credibility, accuracy, and dependability of the collected data.

Results

Demographic Profile of Respondents

The demographic information of the 200 participants provides a snapshot of the sample population. The data, summarized in Table 1, illustrates diversity across key categories including university type, gender, age, year of study, and field of study.

The majority of respondents (60%) were from public universities, reflecting their larger enrolment capacity in Malaysia, while 40% were from private universities. This distribution ensures that the findings are representative of the broader Malaysian higher education landscape.

In terms of gender, the sample comprised 55% female and 45% male students, indicating a relatively balanced gender representation. Regarding age, the largest cohort (65%) fell within the 20-22 age bracket, which is typical for undergraduate students. A further 25% were aged 19 or below, primarily representing foundation or first-year students, and 10% were 23 years or older, which may include postgraduate students or those with prior work experience.

The distribution by year of study was also well-represented: 30% were in their first year, 35% in their second year, 25% in their third year, and 10% in their fourth year or beyond. This spread allows for insights across different stages of the academic journey.

Finally, the field of study was categorized to ensure a multidisciplinary perspective. The largest group was from Social Sciences and Humanities (30%), followed closely by Science, Technology, Engineering, and Mathematics (STEM) at 28%, and Business and Management at 22%. This variety strengthens the generalizability of the study's results across different academic disciplines.

Table 1: Demographic Profile of Respondents (N=200)

Demographic Category	Category	Frequency (n)	Percentage (%)
University Type	Public University	120	60%
	Private University	80	40%
Gender	Male	90	45%
	Female	110	55%
Age	19 or below	50	25%
	20 - 22 years	130	65%
	23 years and above	20	10%
Year of Study	First Year	60	30%
	Second Year	70	35%
	Third Year	50	25%
	Fourth Year and Above	20	10%
Field of Study	Social Sciences and Humanities	60	30%
	Science, Technology, Engineering and Math (STEM)	56	28%
	Business and Management	44	22%
	Health Sciences	26	13%
	Arts and Design	14	7%

Descriptive Statistics

Descriptive statistics, including mean scores and standard deviations, were computed for the five main constructs of the study to understand the central tendency and dispersion of the participants' responses. The results are summarized in Table 2.

The analysis revealed that all mean scores were above the midpoint of 3.0 on the 5-point Likert scale, indicating a generally positive perception among the students towards all the factors influencing heutagogy learning practices.

Notably, Technology Integration received the highest mean score (M = 4.18, SD = 0.59). This suggests that students highly value and are actively engaged with digital tools and platforms in their language learning process, viewing them as essential enablers of self-determined learning.

This was closely followed by Learner Autonomy (M = 4.05, SD = 0.55), indicating a strong appetite among Malaysian undergraduates for having control and agency over their learning goals, paths, and processes.

The dependent variable, Enhanced Learning Practices, also scored highly (M = 4.00, SD = 0.51), reflecting a positive perception that the integration of heutagogy and technology effectively improves

their language learning engagement and effectiveness.

The mean scores for Reflective Practice (M = 3.92, SD = 0.62) and Institutional Support (M = 3.85, SD = 0.67), while still positive, were relatively lower. This implies that while students are engaged, there may be more potential to deepen critical reflection on learning and that institutional structures could be further strengthened to fully support this pedagogical shift.

Table 2: Descriptive Statistics for Main Constructs (N=200)

Variable	Mean	Standard Deviation
Learner Autonomy	4.05	0.55
Technology Integration	4.18	0.59
Reflective Practice	3.92	0.62
Institutional Support	3.85	0.67
Enhanced Learning Practices	4.00	0.51

Reliability and Correlation Analysis

Prior to hypothesis testing, the internal consistency reliability of the constructs was assessed using Cronbach's Alpha. As shown in Table 3, all constructs demonstrated high reliability, with coefficients exceeding the recommended threshold of 0.70, ranging from 0.84 to 0.89. This indicates excellent internal consistency and measurement reliability for all variables.

Subsequently, Pearson correlation analysis was conducted to examine the bivariate relationships between the independent variables (Learner Autonomy, Technology Integration, Reflective Practice, Institutional Support) and the dependent variable (Enhanced Learning Practices). The results, presented in Table 3, revealed statistically significant positive correlations between all variables at the 0.01 level.

The dependent variable, Enhanced Learning Practices, showed strong positive correlations with all four independent constructs. The strongest relationship was observed with Technology Integration ($r = 0.75$, $p < 0.01$), suggesting that the use of digital tools is highly associated with improved self-determined learning outcomes. This was closely followed by its correlation with Learner Autonomy ($r = 0.72$, $p < 0.01$), underscoring the fundamental link between student control and effective learning practices. Furthermore, strong, statistically significant correlations were also found with Reflective Practice ($r = 0.69$, $p < 0.01$) and Institutional Support ($r = 0.66$, $p < 0.01$).

The inter-correlations among the independent variables were also all positive and significant ($p < 0.01$), with coefficients ranging from 0.59 to 0.70. This indicates that the constructs are related but distinct, measuring different aspects of the heutagogy learning environment. The absence of correlations exceeding 0.90 suggests that multicollinearity is not a critical concern for subsequent regression analysis.

Table 3: Correlation Matrix

Variable	1	2	3	4	5	Cronbach's Alpha (α)
Learner Autonomy	1					0.87
Technology Integration	.70**	1				0.89
Reflective Practice	.68**	.65**	1			0.85
Institutional Support	.62**	.67**	.59**	1		0.84
Enhanced Learning Practices	.72**	.75**	.69**	.66**	1	0.86

Note: ** Correlation is significant at the 0.01 level (2-tailed)

Regression Analysis

Multiple regression analysis yielded significant results ($F(4,195) = 98.75$, $p < 0.001$), with the model explaining 67% ($R^2 = 0.67$) of the variance in Enhanced Learning Practices. Technology Integration emerged as the strongest significant predictor ($\beta = 0.39$, $p < 0.001$), followed by Learner Autonomy ($\beta = 0.35$, $p < 0.001$).

A multiple linear regression analysis was conducted to determine the extent to which the four independent variables (Learner Autonomy, Technology Integration, Reflective Practice, and Institutional Support) predict the dependent variable (Enhanced Learning Practices). The assumptions of linearity, independence of errors, homoscedasticity, and absence of multicollinearity were checked and met prior to the analysis. The Variance Inflation Factor (VIF) values for all predictors were below 2.5, confirming that multicollinearity was not a concern.

The regression model was statistically significant, $F(4, 195) = 98.75$, $*p* < .001$, indicating that the combination of these four factors reliably predicts Enhanced Learning Practices. The model explains **67%** (Adjusted $R^2 = 0.67$) of the variance in the dependent variable, which represents a large effect size.

As presented in Table 4, all four independent variables were found to be significant positive predictors of Enhanced Learning Practices. Technology Integration emerged as the strongest predictor ($\beta = 0.39$, $p < .001$), indicating that a one-standard-deviation increase in Technology Integration is associated with a 0.39 standard deviation increase in Enhanced Learning Practices when all other variables are held constant. Learner Autonomy was identified as the second strongest predictor ($\beta = 0.35$, $p < .001$), highlighting the critical role of student agency and self-determination in improving learning outcomes. Institutional Support ($\beta = 0.28$, $p < .001$) and Reflective Practice ($\beta = 0.25$, $p < .001$) also contributed significantly to the model, although their effects were comparatively smaller. Overall, these findings confirm all four hypotheses (H1, H2, H3, and H4), demonstrating that Learner Autonomy, Technology Integration, Reflective Practice, and Institutional Support are significant contributors to the enhancement of student-centred language learning practices within a heutagogy framework.

Table 4: Summary of Multiple Regression Analysis for Variables Predicting Enhanced Learning Practices (N=200)

Predictor	β	Std. Error	t-value	p-value
(Constant)		0.15	12.10	< .001
Technology Integration	0.39	0.04	9.75	< .001
Learner Autonomy	0.35	0.05	7.00	< .001
Institutional Support	0.28	0.05	5.60	< .001
Reflective Practice	0.25	0.06	4.17	< .001
R^2	0.67			
Adjusted R^2	0.66			
F-statistic	98.75			
p-value (Model)	< .001			

Note: β = Standardized Beta Coefficient; Dependent Variable: Enhanced Learning Practices

Discussion

The findings of this study present compelling empirical evidence for the transformative potential of integrating heutagogy with digital technology in Malaysian higher education. Moving beyond conceptual discourse, the results demonstrate a clear and systematic influence of Technology Integration, Learner Autonomy, Institutional Support, and Reflective Practice on enhancing student-centred language learning. A hierarchical pattern emerges from the analysis, revealing Technology Integration and Learner Autonomy as the most dominant predictors of heutagogy-based learning, reinforced by the critical roles of Institutional Support and Reflective Practice.

Technology as the Prime Enabler of Self-Determined Learning

The most decisive finding of this research is the preeminent role of Technology Integration ($\beta = 0.39$, $p < 0.001$). It functions not merely as an influential factor but as the foundational enabler upon which modern self-determined learning is built. The notably high mean score ($M = 4.18$) indicates that students themselves perceive digital tools ranging from Learning Management Systems and AI tutors to collaborative platforms as indispensable for actively taking control of their educational journey. This finding shifts the narrative on educational technology in Malaysia from a passive utility to an active agent of pedagogical change, supporting the strategic vision outlined in the Malaysia Education Blueprint and suggesting that investments in digital infrastructure are direct investments in pedagogical innovation and learner empowerment.

This result aligns with evidence consistently reported in prior research showing that technology supports and enhances self-determined learning (34, 54, 55). Digital tools have been shown to facilitate personalized learning experiences and advance learner agency across diverse educational settings. Furthermore, research has explored the crucial role technology plays in supporting heutagogy approaches and fostering lifelong learning across diverse contexts (56). This provides a vital validation within a

developing nation's context, asserting that technological integration is a important prerequisite for closing the gap between policy ambition and classroom reality.

The Assertion of Learner Autonomy: A Paradigm Shift in Readiness

The powerful influence of Learner Autonomy ($\beta = 0.35$, $p < 0.001$), coupled with its consistently high mean score ($M = 4.05$), represents a culturally significant finding within the Malaysian higher education context. This result definitively counters any outdated presumption that Malaysian students are predisposed to, or content with, passive, teacher-centric instructional models. Instead, our empirical data reveal a strong, latent demand for agency among students manifested as a desire to actively set goals, make informed choices, and independently direct their linguistic learning journeys. This is particularly noteworthy given that discussions surrounding learner autonomy in Asian contexts often highlight socio-cultural factors that may influence its implementation and perception (57–59). Our findings suggest that despite traditional pedagogical leanings, there is a clear readiness among students for a more self-determined approach to learning (60).

This finding serves as a suggests to both educators and policymakers, indicating that the student body is prepared and eager for the pedagogical shift towards heutagogy advocated by national educational policies. The robust correlation ($r = 0.72$) between learner autonomy and enhanced learning practices strongly affirms the core philosophical tenet of heutagogy: that true learning efficacy is inextricably linked to the learner's capacity for self-direction and agency, as has been widely established in prior research on self-determined learning (6, 11, 12). The role of heutagogy in empowering learners and promoting self-determined learning has been consistently established in prior research (13, 56). Embracing and fostering this inherent autonomy is not merely a progressive pedagogical choice; it is a fundamental and necessary step to cultivate the creativity, critical thinking, and lifelong learning skills increasingly demanded by the global knowledge economy (61, 62). This underscores the need for educational frameworks that empower students to navigate complex learning environments and assume greater responsibility for their own development (63, 64).

The Essential Scaffolding: Institutional Support and Reflective Practice

While Technology Integration and Learner Autonomy emerge as paramount catalysts, the broader educational ecosystem that supports them remains vital. The significant, though comparatively lesser, predictive power of Institutional Support ($\beta = 0.28$, $p < 0.001$) underscores a critical message: student autonomy and technology-enhanced learning cannot flourish in an institutional vacuum. Reliable digital infrastructure, consistent access to essential software, comprehensive professional training, and supportive institutional policies have been identified as foundational conditions for sustaining self-determined learning environments (65, 66). The lower mean score for Institutional Support ($M = 3.85$) pinpoints a key area for strategic improvement across the Malaysian higher education sector, aligning with documented challenges related to infrastructure, implementation, and the critical need for robust administrative and management support in technology adoption (67). These finding highlights that effective institutional backing, encompassing both technical and pedagogical support, is crucial for fostering a conducive environment for heutagogy practices and reducing the disparity between policy aspirations and classroom realities (30, 66).

Similarly, reflective practice ($\beta = 0.25$, $p < 0.001$) completes the learning cycle, confirming that effective heutagogy involves not just doing but thinking about the doing. This process of metacognition, in which students critically evaluate their progress, strategies, and assumptions, is precisely what transforms mere activity into deep capability and facilitates deeper reflective learning processes that enable learners to re-evaluate underlying assumptions and strategies (5, 6). The interrelationship between metacognition and reflective processes has been consistently established in earlier research, with double-loop learning requiring critical reflection to synthesize learning experiences (7). Learning processes that involve the re-evaluation of underlying assumptions and values have been shown to lead to deeper understanding and more effective problem-solving capabilities (68, 69). The marginally lower mean rating for reflective practice ($M = 3.92$) suggests that while students

engage in learning, there is a crucial opportunity for educators to more intentionally design and facilitate structured reflective processes to deepen the learning impact. Integrating digital tools, such as e-portfolios or online reflective journals, can effectively support the development of these metacognitive skills and foster deeper learning within modern educational environments (70, 71, 72). Such intentional design is essential for moving beyond superficial learning and cultivating truly self-determined, capable learners (73–75).

Implications for Malaysian Higher Education Assessment Reform

The findings of this study highlight important implications for how Malaysian universities must re-envision assessment practices to align with heutagogy and support genuinely self-determined learning. Although recent national policies strongly advocate for innovative and student-centred pedagogies, assessment practices across Malaysian higher education remain largely anchored in summative, exam-driven models. Such approaches limit learner autonomy, constrain reflective engagement, and hinder the development of capability-based competencies key elements identified in this study as essential for enhancing heutagogy learning practices.

To operationalize heutagogy principles, Malaysian universities must shift from evaluating content mastery toward assessing learners' capability, agency, and reflective growth. This necessitates a redesign of assessment structures in several ways. First, authentic and flexible assessments should be prioritized over rigid, standardized examinations. Examples include digital portfolios, reflective journals, self- and peer-assessments, project-based tasks, multimodal artefacts, and real-world problem-solving demonstrations. These assessment forms enable students to take ownership of their learning goals while demonstrating competencies in ways that reflect heutagogy principles.

Second, formative assessment must become the cornerstone of evaluation. Integration of technological tools from LMS learning analytics to AI-driven feedback systems offers opportunities for real-time, personalized feedback that supports learner self-regulation and deepens engagement. Continuous formative assessment also facilitates double-loop learning, enabling students to critically evaluate their assumptions, strategies, and progress.

Third, assessment rubrics should be recalibrated to include heutagogy-oriented indicators such as autonomy in decision-making, reflective depth, creativity, adaptability, and technological engagement, rather than focusing primarily on cognitive recall. This ensures alignment with 21st-century graduate attributes and lifelong learning goals.

Finally, institutional policies must evolve to accommodate flexible assessment modalities, negotiated assessment criteria, extended timelines, and interdisciplinary project integration. These changes provide the institutional scaffolding needed for heutagogy to thrive and ensure holistic alignment between policy aspirations, pedagogical practices, and assessment implementation.

Overall, reforming assessment procedures is essential for Malaysian universities to realize the full potential of heutagogy. Aligning assessment systems with learner autonomy, reflective practice, and technology-enhanced learning can bridge the gap between current institutional practices and the competencies required of future-ready graduates.

Limitations and Future Research

Although this study provides important insights, several limitations warrant consideration. The use of self-reported data restricts the ability to triangulate actual behaviours, and the cross-sectional design captures relationships at only one point in time, limiting causal inference. Additionally, the sample, though adequate, is drawn from a limited number of institutions, which may constrain generalizability.

Future research should therefore explore longitudinal designs to examine changes in learner capability and language proficiency over time. Mixed-methods approaches including interviews, classroom observations, and learning analytics would provide richer insights into how heutagogy is enacted and experienced in practice. Furthermore, extending the model to other disciplines could assess whether heutagogy-technology integration is equally effective beyond the domain of language learning.

Conclusion

This study offers robust empirical evidence that integrating heutagogy with digital technology is a powerful catalyst for enhancing student-centred language learning in Malaysian higher education. Technology Integration and Learner Autonomy emerge as the most influential predictors of self-determined learning, supported meaningfully by Institutional Support and Reflective Practice. The results demonstrate that Malaysian learners are not only receptive to but actively ready for a pedagogical shift towards greater autonomy and digital engagement. This presents a timely opportunity for educators, curriculum designers, and policymakers to realign teaching practices with both learner expectations and the aspirations of the Malaysia Education Blueprint. Fully realizing this potential requires sustained investment in digital infrastructure, curriculum designs that promote ownership and flexibility, strengthened institutional support systems, and deliberate incorporation of reflective practices. By embracing these reforms, Malaysian higher education can meaningfully advance toward cultivating autonomous, reflective, technologically proficient, and future-ready graduates.

Abbreviations

AI - Artificial Intelligence, HE - Higher Education, LMS - Learning Management System, SPSS - Statistical Package for the Social Sciences.

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Author Contributions

Nurul Aisyah Kamrozzaman: conceptualization, writing, Sofia Elias: data collection, analysis.

Conflict of Interest

The authors declare that there is no conflict of interest for the publication of this paper.

Declaration of Artificial Intelligence (AI) Assistance

During the preparation of this manuscript, the authors used ChatGPT to assist with improving grammar, coherence, and formatting alignment with journal guidelines. After using this tool, the authors reviewed and edited the content thoroughly to ensure accuracy and originality. The authors take full responsibility for the integrity, analysis, and conclusions of the manuscript.

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