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Empowering HOTS Through Web-Based Independent Learning: The Mediating Effects of Self-Efficacy and Self-Concept

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Abstract

Background:
This study investigates the effect of web-based independent learning (WBIL) on students' higher-order thinking skills (HOTS), with self-efficacy (SE) and self-concept (SC) as mediating variables, within the context of translation learning in higher education.

Methodology:
A quantitative research design was employed using Partial Least Squares Structural Equation Modeling (PLS-SEM). Data were collected from 55 undergraduate students enrolled in translation-related courses through validated instruments measuring WBIL, SE, SC, and HOTS.

Findings:
The findings indicate that WBIL has a significant positive effect on both self-efficacy and self-concept. Furthermore, both SE and SC significantly predict students' HOTS, with self-efficacy emerging as the stronger predictor. Mediation analysis reveals that SE and SC partially mediate the relationship between WBIL and HOTS, indicating that WBIL enhances higher-order thinking skills both directly and indirectly through psychological mechanisms. This study contributes to the literature by providing empirical evidence of the WBIL–HOTS relationship specifically within translation learning, a context that requires complex cognitive processes such as analysis, evaluation, and creative decision-making. Unlike prior studies that primarily focus on general digital learning or STEM contexts, this research highlights the role of psychological factors in shaping higher-order thinking in language-based disciplines.

Conclusion:
The findings underscore the importance of integrating learner autonomy and psychological readiness in designing effective web-based learning environments for translation education.

Originality:
This study provides empirical evidence of the WBIL–HOTS relationship specifically within translation learning, a context requiring complex cognitive processes. Unlike prior studies focusing primarily on general digital learning or STEM contexts, this research highlights the crucial role of psychological factors in shaping higher-order thinking in language-based disciplines.

Keywords	:	web-based independent learning; self-efficacy; self-concept; higher-order thinking skills; translation learning
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1. INTRODUCTION

The integration of digital platforms into higher education has shifted learning beyond the boundaries of conventional classrooms, enabling students to access resources, manage their own study pace, and engage with content independently (Guo et al., 2022). Web-based independent learning (WBIL) has emerged as an instructional model that supports self-directed exploration through flexible, technology-mediated environments. Studies confirm that WBIL fosters learner autonomy and strengthens engagement by providing students with repeated access to materials, personalized time management, and opportunities for self-assessment (Lin & Hsieh, 2001). In such environments, students are encouraged to take greater responsibility for their learning, which can stimulate exploration and intellectual risk-taking.

A growing body of research has examined whether WBIL and related digital learning approaches can enhance higher-order thinking skills (HOTS), which include analytical, evaluative, and creative cognitive processes at the upper levels of Bloom's revised taxonomy. The importance of HOTS has been widely emphasized in contemporary education, particularly in response to the increasing complexity of knowledge and problem-solving demands in the digital era (Fadila et al., 2024; Tyas & Naibaho, 2021). In STEM education, the evidence is encouraging: Hariadi et al. (2022) demonstrated that a blended web mobile learning model significantly improved HOTS-based outcomes among 137 high school biology students in Indonesia; Anwar et al. (2023) reported moderate-to-high effectiveness for a web-integrated learning model in training physics students' analyzing and evaluating skills; and Handayani et al. (2024) found positive student responses to web-based learning designed around HOTS activities in an academic reading course. Similarly, Arianto et al. (2026) showed that a Deep Digital Learning model significantly outperformed conventional digital learning in fostering critical thinking and problem-solving among university students.

However, these studies share a common limitation: they are concentrated in science education and general academic skills, with limited empirical attention to how WBIL influences HOTS development in translation learning. This gap is significant because translation requires a distinctive cognitive profile. Unlike STEM problem-solving, translation involves cross-linguistic analysis, evaluative judgment between competing target-text options, and creative adaptation of meaning across cultural contexts, all of which are inherently higher-order cognitive activities (Marczak, 2018). Previous studies have shown that embedding critical thinking instruction into translation teaching can improve both critical thinking and

translation performance. However, this intervention was conducted in a classroom-based setting rather than a web-based environment. (Chernovaty & Kovalchuk, 2021) further indicated that the intensity of analytical thinking during independent online translation work predicted students' critical engagement with terminological problems, although their study was limited in scope and did not explicitly examine HOTS as a broader construct.

Meanwhile, research on web-based learning in translation has primarily focused on student perceptions and satisfaction (Almakky, 2024; Burkšaitienė, 2025; Mebarki, 2024), translation proficiency gains (Muftah, 2022), or instrumental competence with digital tools (Mohammed & Al-Sowaidi, 2023), rather than on the development of higher-order cognitive skills. A systematic review by Aiyar (2021) also highlighted the limited number of studies employing web-based learning approaches specifically designed to promote HOTS in language education. Consequently, an important question remains unanswered: to what extent can WBIL foster higher-order thinking skills in translation learning, where cognitive demands differ substantially from those in other disciplines?

In addition to instructional design, psychological factors such as self-efficacy (SE) and self-concept (SC) play a crucial role in shaping students' cognitive engagement and learning outcomes. SE refers to learners' beliefs in their ability to successfully perform academic tasks, while SC reflects their perceptions of their own academic competence. Prior research has demonstrated that these constructs influence motivation, persistence, and higher-level cognitive performance. However, limited studies have examined how SE and SC function as mediating mechanisms in the relationship between WBIL and HOTS, particularly within translation learning contexts.

Therefore, this study aims to address these gaps by examining the direct and indirect effects of WBIL on students' HOTS, with SE and SC as mediating variables, within the context of translation learning in higher education. Using web-based platforms such as Google Classroom and EdLink, this study provides a more consistent operationalization of WBIL as a learner-controlled digital learning environment. To the best of the authors' knowledge, this study is among the first to investigate the WBIL–HOTS relationship in translation learning while simultaneously incorporating psychological mediators, thereby offering a more comprehensive understanding of how web-based independent learning contributes to higher-order thinking development.

2. LITERATURE REVIEW

In the implementation of web-based independent learning (WBIL), technological tools alone do not determine its effectiveness, although their presence remains essential. Instead, psychological factors such as self-efficacy (SE) and self-concept (SC) play a crucial role in shaping learners' engagement and success in autonomous learning environments. SE, a concept introduced by Bandura, (2012), refers to an individual's belief in their capacity to successfully perform actions required to achieve specific learning goals. In educational contexts, learners with high self-efficacy tend to demonstrate greater confidence in addressing academic challenges, persist longer when encountering difficulties, and exhibit stronger intrinsic motivation (Brashi, 2022). Recent studies further confirm that SE is a strong predictor of learning engagement, motivation, and academic performance in online environments (Brashi, 2022; Guo et al., 2022). This belief system forms a psychological foundation for initiating and sustaining self-regulated learning in web-based settings.

In addition to SE, self-concept (SC) represents an individual's overall perception, evaluation, and understanding of their own abilities (Blum et al., 2021; Saikia, 2020). SC encompasses both cognitive and affective dimensions that shape how learners perceive their competence in academic contexts. (Saikia, 2020) emphasizes that SC influences behaviour, motivation, and adaptability in learning processes. Unlike self-efficacy, which is task-specific, SC reflects a broader and more stable perception of academic capability. Empirical studies have shown that SC is positively associated with higher-order thinking skills (HOTS), as learners with a stronger academic self-concept are more likely to engage in complex cognitive processes such as analysis, evaluation, and problem-solving (Azizah et al., 2022; Wahida et al., 2021). These findings suggest that SC plays a significant role in supporting cognitive development in learning environments.

Previous research also indicates that SE and SC jointly contribute to students' cognitive performance. Students with higher levels of SE tend to approach academic tasks with confidence, persistence, and strategic effort, while those with a positive SC demonstrate stronger motivation and adaptive learning behaviours. Together, these constructs support the development of HOTS by encouraging learners to engage in deeper cognitive processing. Empirical evidence shows that SE and related psychological constructs significantly contribute to higher-order thinking performance (Nurulwati et al., 2022; Rohmah et al., 2023). Furthermore, studies in language learning contexts indicate that SE often emerges as a stronger predictor of academic achievement, while SC complements this by shaping learners' overall academic identity and engagement (Chen et al., 2025; Kirmizi, 2015).

Within the context of translation learning, psychological factors become even more critical due to the complex cognitive demands involved. Translation requires not only linguistic competence but also analytical reasoning, evaluative judgment, and creative problem-solving. Previous studies have shown that self-efficacy plays a significant role in translation performance, influencing learners' ability to manage ambiguity, process source texts, and apply appropriate strategies (Bolaños-Medina, 2014; Huang et al., 2020). More recent research also indicates that translation self-efficacy is closely related to metacognitive regulation and performance in technology-mediated translation tasks (Li, 2024). These findings highlight the importance of integrating psychological constructs into the study of translation learning, particularly in digital environments.

Furthermore, individual characteristics such as psychological readiness, self-efficacy, and self-concept interact with cognitive capacity to influence the effectiveness of learning. The success of WBIL, therefore, cannot be attributed solely to technological accessibility. Without adequate psychological support, learners may experience reduced engagement, lack of focus, and suboptimal cognitive outcomes. In contrast, integrating psychological factors into web-based learning design has been shown to improve engagement and learning effectiveness (Abdullah et al., 2024; Althewini, 2025; S & Salim, 2024).

Based on this theoretical and empirical foundation, this study aims to examine the role of WBIL in fostering higher-order thinking skills (HOTS) by incorporating self-efficacy (SE) and self-concept (SC) as key mediating variables. By exploring the interaction between learner autonomy, psychological readiness, and cognitive development within translation learning, this study seeks to contribute to a more comprehensive understanding of effective web-based learning design.

2.1 Conceptual Framework

In particular, this study formulated six hypotheses. First, it is posited that WBIL will exert a positive influence on self-efficacy (SE), as learners who actively engage in online environments are likely to develop a stronger sense of agency in their academic pursuits (H1). Second, WBIL is expected to positively affect self-concept (SC), as self-directed online learning can enhance students' perceptions of themselves as competent and autonomous learners (H2).

Furthermore, self-efficacy is hypothesized to positively predict higher-order thinking skills (HOTS), as students with stronger confidence in their abilities are more likely to engage

in complex cognitive processes (H3). Similarly, self-concept is expected to positively influence HOTS, as a positive academic self-perception supports deeper cognitive engagement (H4). In addition, WBIL is hypothesized to have a direct positive effect on HOTS (H5). Finally, this study proposes that SE and SC mediate the relationship between WBIL and HOTS, indicating that WBIL influences higher-order thinking both directly and indirectly through psychological mechanisms (H6).

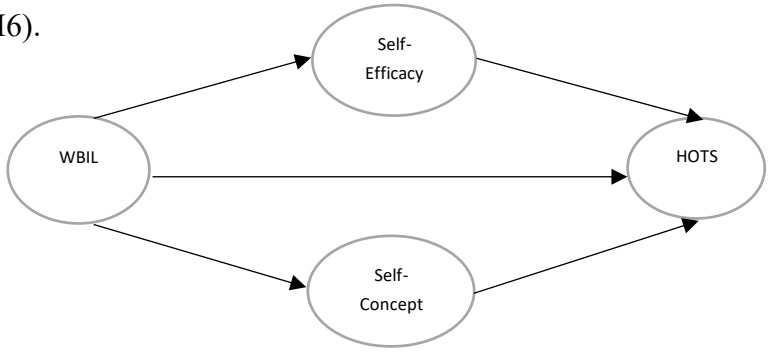

Figure 1. Hypothesis Model

3. METHODOLOGY

This study employed a quantitative, explanatory design to evaluate a parallel mediation model in which web-based independent learning (WBIL) affects higher-order thinking skills (HOTS) both directly and indirectly through self-efficacy (SE) and self-concept (SC). Given the relatively small sample size and the predictive nature of the model, Partial Least Squares Structural Equation Modeling (PLS-SEM) was utilized, as it is appropriate for exploratory analysis, small samples, and data that may not meet normality assumptions (Hair et al., 2021).

3.1 Research Setting and Participants

The study was conducted at a medium-sized Indonesian university in courses related to translation studies that integrated web-based learning into their instructional design. The participants consisted of 55 undergraduate students selected using total sampling from two intact classes. This sampling approach was chosen to ensure that all students who experienced the WBIL environment were included in the analysis. The average age of participants was 20.4 years (SD = 1.3), with 80% identifying as female and 20% as male. All participants had at least one semester of prior experience using online learning platforms, including Google Classroom and the university's learning management system, EdLink (Education Link), ensuring familiarity with web-based learning environments.

3.2 Data Collection Procedure

Data collection was conducted over one academic semester. WBIL activities were implemented through Google Classroom and EdLink, where students engaged in independent translation tasks, accessed learning materials, and submitted assignments. At the end of the

learning period, students were asked to complete questionnaire-based instruments measuring WBIL, SE, and SC. In addition, students completed performance-based HOTS tasks designed within the translation course. All responses were collected anonymously to ensure confidentiality. Missing data were minimal and handled using listwise deletion, as the dataset was complete for the majority of participants.

3.3 Ethical Considerations

This study adhered to ethical research standards involving human participants. Prior to data collection, students were informed about the purpose of the study and provided informed consent to participate voluntarily. Participation was entirely voluntary, and students were assured that their responses would be used solely for research purposes and would not affect their academic evaluation. Institutional approval was obtained from the relevant academic authority at the university before conducting the study.

3.4 Instruments

This study utilized validated instruments to measure WBIL, SE, SC, and HOTS. WBIL was assessed using a shortened version of the Online Self-Regulated Learning Questionnaire (OSRQ) (Barnard et al., 2009), consisting of 5 items covering goal setting, time management, and the use of online resources, measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Self-efficacy was measured using a modified version of the Academic Self-Efficacy Scale (Chemers et al., 2001), consisting of 4 items adapted to online learning contexts. Higher scores indicated stronger confidence in academic abilities.

Self-concept was assessed using a 4-item scale adapted from the Self-Description Questionnaire II (Marsh et al., 2005), focusing on students perceived academic competence. Responses were measured on a five-point Likert scale.

HOTS were evaluated using three performance-based translation tasks aligned with the "analyze," "evaluate," and "create" levels of Bloom's revised taxonomy (Wilson, 2016). The "analyze" task required students to identify linguistic and semantic differences between source and target texts. The "evaluate" task involved assessing translation alternatives and justifying the most appropriate choices. The "create" task required students to produce a complete translation while adapting meaning to contextual and cultural considerations. Each task was assessed using a standardized analytic rubric.

To ensure scoring consistency, two trained raters independently evaluated all HOTS tasks. The inter-rater reliability was high (intraclass correlation coefficient = .85), indicating strong agreement between raters.

3.5 Data Analysis

Data were analyzed using PLS-SEM following the guidelines proposed by (Hair et al., 2021). The measurement model was evaluated by examining internal consistency reliability (Cronbach's alpha and composite reliability), convergent validity (average variance extracted, AVE), and indicator loadings. Discriminant validity was assessed using the Fornell-Larcker criterion.

The structural model was evaluated through path coefficients (β), t-values, p-values, coefficient of determination (R^2), and effect size (f^2). Bootstrapping with 5,000 resamples was conducted to test the significance of the hypothesized relationships. Collinearity was assessed using variance inflation factor (VIF) values to ensure no multicollinearity issues among predictors.

3.6 Reliability and Validity

All constructs demonstrated acceptable reliability, with Cronbach's alpha values exceeding the recommended threshold of 0.70 (Hair et al., 2021). In addition, all indicator loadings were above 0.50, supporting convergent validity. Composite reliability values exceeded 0.70, and AVE values were above 0.50, confirming the adequacy of the measurement model. Discriminant validity was also established, as each construct was empirically distinct from the others.

Table 1. Summary of Reliability and Validity Test of the Instruments

Construct	No. of Items	Cronbach's α	Composite Reliability	AVE	Factor Loadings Range
WBIL	5	0.87	>0.70	>0.50	0.71 – 0.84
SE	4	0.85	>0.70	>0.50	0.73 – 0.86
SC	4	0.88	>0.70	>0.50	0.75 – 0.88
HOTS	3	0.82	>0.70	>0.50	—

4. FINDINGS

This study aimed to analyze the influence of web-based independent learning (WBIL) on students' higher-order thinking skills (HOTS) and to examine the mediating roles of self-efficacy (SE) and self-concept (SC). The analysis employed PLS-SEM to test the proposed

hypotheses in accordance with the conceptual framework. The measurement model demonstrated acceptable reliability and validity, as reported in the methodology section.

4.1 WBIL Positively Affects SE and SC (H1 and H2)

The results of the structural model indicate that WBIL has a significant and positive effect on both SE and SC. Specifically, the path from WBIL to SE was statistically significant ($\beta = 0.46$, $t = 5.12$, $p < 0.001$), with an R^2 value of 0.21. Similarly, WBIL had a significant positive effect on SC ($\beta = 0.39$, $t = 4.63$, $p < 0.001$), with an R^2 value of 0.18. Table 2 presents the detailed results of the relationships between WBIL, SE, and SC.

Table 2. PLS-SEM Result for WBIL → SE and SC

Path	β	t-value	p-value	R^2	f^2	Interpretation
WBIL → SE	0.46	5.12	<0.001	0.21	0.27	Supported
WBIL → SC	0.39	4.63	<0.001	0.18	0.19	Supported

The effect sizes were moderate for both relationships ($f^2 = 0.27$ for SE and $f^2 = 0.19$ for SC), indicating that WBIL plays a meaningful role in influencing key psychological constructs. These findings suggest that students who actively engage in WBIL tend to develop stronger academic confidence and a more positive self-perception as learners. Therefore, H1 and H2 are supported.

4.2 SE and SC Positively Affect HOTS (H3 and H4)

The analysis further shows that both SE and SC significantly predict HOTS. The path from SE to HOTS was positive and statistically significant ($\beta = 0.41$, $t = 4.97$, $p < 0.001$), indicating that higher self-efficacy is associated with better HOTS performance. The effect size ($f^2 = 0.23$) indicates a moderate contribution of SE.

Similarly, SC had a significant positive effect on HOTS ($\beta = 0.28$, $t = 3.15$, $p = 0.002$), with a smaller but still meaningful effect size ($f^2 = 0.11$). Table 3 summarizes the results of the relationships between SE, SC, and HOTS.

Table 3. PLS-SEM Result for SE & SC → HOTS

Path	β	t-value	p-value	f^2	Result
SE → HOTS	0.41	4.97	<0.001	0.23	Supported
SC → HOTS	0.28	3.15	0.002	0.11	Supported

These findings indicate that both psychological constructs contribute to the development of higher-order thinking skills, with SE emerging as a stronger predictor compared to SC. Therefore, H3 and H4 are supported.

4.3 WBIL Directly Affects HOTS (H5)

The direct effect of WBIL on HOTS was found to be positive and statistically significant ($\beta = 0.32$, $t = 3.84$, $p < 0.001$). The R^2 value for HOTS was 0.47, indicating that WBIL, SE, and SC collectively explained 47% of the variance in HOTS. This reflects a moderate level of explanatory power and suggests that other variables not included in the model may also influence HOTS. Table 4 presents the detailed results of the direct effect of WBIL on HOTS.

Table 4. PLS-SEM Result for WBIL → HOTS

Path	β	t-value	p-value	R^2	f^2	Interpretation
WBIL → HOTS	0.32	3.84	<0.001	0.47	0.12	Positive

The effect size for this relationship was $f^2 = 0.12$, which is considered small to moderate. This suggests that WBIL contributes to HOTS both independently and alongside psychological factors. Thus, H5 is supported.

SE and SC Mediate the Relationship Between WBIL and HOTS (H6)

The mediation analysis revealed that both SE and SC significantly mediate the relationship between WBIL and HOTS. The indirect effect through SE was significant ($\beta = 0.19$, $t = 4.02$, $p < 0.001$), while the indirect effect through SC was also significant ($\beta = 0.11$, $t = 2.97$, $p = 0.003$). Table 5 presents the results of the mediation analysis.

Table 5. Mediation Results

Path	Indirect Effect	t-value	p-value	Mediation	Result
WBIL → SE → HOTS	0.19	4.02	<0.001	Partial	Supported
WBIL → SC → HOTS	0.11	2.97	0.003	Partial	Supported
Total Indirect Effect	0.30	4.56	<0.001	—	Significant
WBIL → HOTS (Direct)	0.32	3.84	<0.001	—	Supported

The total indirect effect ($\beta = 0.30$, $p < 0.001$) indicates that psychological factors play an important role in explaining how WBIL influences HOTS. The continued significance of the direct effect confirms partial mediation, suggesting that WBIL enhances HOTS both directly and indirectly through SE and SC. Therefore, H6 is supported.

5. DISCUSSION

This study examined the role of web-based independent learning (WBIL) in fostering higher-order thinking skills (HOTS) among university students in translation courses, with self-efficacy (SE) and self-concept (SC) modeled as mediating variables. The findings confirm that WBIL contributes to HOTS both directly and indirectly through psychological mechanisms, supporting the proposed model.

The finding that WBIL significantly enhances self-efficacy is consistent with social cognitive theory (Bandura, 2012), which emphasizes that individuals develop confidence through mastery experiences and self-directed learning. This interpretation is further supported by foundational work on self-efficacy (Bandura, 2012), which highlights the role of repeated task engagement in strengthening learners' belief in their capabilities. In the context of WBIL, students are required to independently engage with translation tasks, manage their learning process, and evaluate their own performance, all of which provide opportunities for mastery experiences. This aligns with previous studies indicating that self-efficacy develops in digital and self-regulated learning environments (Lin & Hsieh, 2001; Zimmerman, 2002). In translation learning specifically, where tasks often involve ambiguity and multiple possible solutions, increased self-efficacy may enable students to make more confident and effective decisions when selecting appropriate translations.

Similarly, WBIL was found to positively influence self-concept, supporting the argument that learner autonomy contributes to the development of positive academic self-perceptions (Marsh & Martin, 2011). Self-concept reflects a broader evaluation of one's academic identity, which is shaped over time through repeated learning experiences. In WBIL environments, students take greater responsibility for their learning, which may reinforce their perception of competence and autonomy. This is consistent with research suggesting that independent learning opportunities can enhance academic self-concept (Guo et al., 2022). However, the effect of SC on HOTS was weaker compared to SE, indicating that general self-perceptions may not directly translate into immediate cognitive performance.

The results further indicate that both SE and SC significantly predict HOTS, with SE emerging as the stronger predictor. This finding can be understood in relation to the nature of translation tasks, which require real-time decision-making, problem-solving, and evaluative judgment. Self-efficacy, as a task-specific belief, directly influences learners' willingness to engage in cognitively demanding activities and persist in the face of uncertainty. This interpretation is consistent with findings that identify self-efficacy as a strong predictor of

performance in complex problem-solving contexts (Holenstein et al., 2022). In contrast, self-concept operates at a more general level and may influence long-term motivation rather than immediate task performance. Therefore, in cognitively intensive domains such as translation, SE plays a more direct and dominant role than SC in shaping HOTS.

The mediation analysis further demonstrates that SE and SC partially mediate the relationship between WBIL and HOTS. This indicates that WBIL enhances HOTS not only through direct exposure to learning tasks but also by strengthening learners' psychological readiness. The presence of partial mediation suggests that additional variables may also contribute to HOTS development. For example, factors such as prior knowledge, language proficiency, and digital literacy may influence how students engage with WBIL environments and process complex information.

From a contextual perspective, the findings highlight the distinctive characteristics of translation learning compared to other disciplines. Unlike many STEM tasks that often involve fixed solutions, translation requires interpretive judgment, cultural sensitivity, and multiple acceptable outcomes. This complexity increases cognitive demands and places greater emphasis on learners' confidence in their decision-making processes. WBIL environments, which provide flexibility and opportunities for repeated practice, appear to support these processes by enabling students to refine both their cognitive and metacognitive strategies.

Despite these contributions, several limitations should be acknowledged. First, the study was conducted with a relatively small sample size (N = 55) from a single institution, which may limit the generalizability of the findings. Second, the gender distribution was imbalanced, with a higher proportion of female participants, which may influence the observed relationships. Third, most variables were measured using self-report instruments, raising the possibility of common-method bias. Although HOTS was assessed through performance-based tasks, the reliance on self-reported data for other constructs should be interpreted with caution. Additionally, the cross-sectional design limits the ability to draw causal inferences. However, the model explains 47% of the variance in HOTS, indicating that other variables not included in this study may also contribute to higher-order thinking development.

Overall, this study contributes to the literature by demonstrating that the effectiveness of WBIL in promoting HOTS is shaped not only by technological affordances but also by learners' psychological characteristics. The findings suggest that educators should design web-based learning environments that actively support the development of self-efficacy and self-concept. In translation education, this may involve providing structured feedback,

opportunities for reflection, and progressively challenging tasks to enhance both confidence and cognitive engagement.

6. CONCLUSION

This study investigated the mediating roles of self-efficacy (SE) and self-concept (SC) in the relationship between web-based independent learning (WBIL) and higher-order thinking skills (HOTS) within the context of translation learning. The findings indicate that WBIL has a positive effect on both SE and SC, suggesting that engagement in self-paced, technology-mediated learning can enhance students' confidence and their perceptions of academic capability. In addition, both SE and SC were found to significantly predict HOTS, highlighting the important role of psychological factors in supporting higher-level cognitive performance.

Furthermore, the results demonstrate that SE and SC partially mediate the relationship between WBIL and HOTS. This indicates that WBIL contributes to the development of higher-order thinking skills both directly and indirectly through learners' psychological readiness. These findings suggest that the effectiveness of web-based independent learning is not solely determined by access to digital tools, but also by how well it supports students' confidence and self-perception as learners.

From a practical perspective, the results imply that educators and curriculum designers should integrate strategies that promote both cognitive engagement and psychological support within web-based learning environments. In translation education, this may involve providing structured feedback, opportunities for reflection, and tasks that encourage independent problem-solving.

However, the findings of this study should be interpreted with caution. The study was conducted using a relatively small sample from a single institution and employed a cross-sectional design, which may limit the generalizability of the results and the ability to infer causal relationships. Future research is recommended to examine these relationships across broader contexts and with longitudinal designs to provide a more comprehensive understanding of the impact of WBIL on HOTS development.

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