ISSN 1798-4769
Journal of Language Teaching and Research, Vol. 16, No. 5, pp. 1682-1693, September 2025
DOI: https://doi.org/10.17507/jltr.1605.26

Integrating Digital and Hybrid Learning Models in Environmental Literature Education: Enhancing Speaking Skills Through Virtual Platforms in the Digital Era

Ifnaldi*
Faculty of Tarbiyah, State Islamic Institute of Curup, Bengkulu, Indonesia

Juanda
Department of Indonesian Language and Literature, Makassaar State University, South Sulawesi, Indonesia

Afnita
Department of Indonesian Language and Literature Education, Padang State University, West Sumatra, Indonesia

Andi Fatimah Yunus
Department of Indonesian Language and Literature, Makassaar State University, South Sulawesi, Indonesia

Iswan Afandi
Department of Indonesian Language and Literature Education, University of Timor, East Nusa Tenggara, Indonesia

***Abstract*—The post-pandemic educational paradigm shift has opened opportunities for technology integration in learning environmental literature. This study examines the effectiveness of a hybrid learning model that combines online and face-to-face learning in improving students' speaking skills, especially in environmental literature. Utilizing platforms such as Zoom and virtual discussion forums, students can speak critically about environmental issues through literary texts. This study aims to evaluate the direct effect of hybrid learning implementation on speaking skills by considering the role of learning motivation as a mediating variable. A quantitative approach was used with mediation regression analysis to examine the effect of hybrid learning on speaking skills through learning motivation. The results showed that hybrid learning significantly improved students' speaking skills, directly and indirectly, with learning motivation playing an important mediator role. The findings suggest that the hybrid learning approach improves speaking skills and deepens students' understanding of environmental issues. This is in line with global education goals. This research provides practical insights for lecturers to design learning strategies that are adaptive, interactive, and relevant to the needs of the digital generation. Future research should involve more educational institutions and explore the use of additional technological tools to support more effective learning.**

***Index Terms*—environmental literature, hybrid learning, language education, speaking, students**

I. Introduction

The post-pandemic learning paradigm shift has paved the way for technology integration in various forms, including environmental literacy education. The hybrid learning model that combines online and offline learning is a strategic alternative that offers flexibility and enriches learning interactions through various digital media such as videos, forums, and collaborative projects (Hasnine et al., 2022, p. 3226). Technology is not just a tool but a new space to foster 21st-century skills, including critical and reflective speaking. Digital platform-based learning, such as Zoom and online forums, allows students to explore and express their understanding of environmental issues through literary texts (Huang et al., 2024; Zvereva, 2020). However, optimizing the role of technology still considers the psychological and cognitive challenges that learners face, such as difficulties in maintaining attention during online learning and managing digital information load (Alotaibi et al., 2025, p. 1).

The effectiveness of this kind of learning relies heavily on learners' learning motivation and adaptability to multimodal approaches. The active participation of hybrid learning can be strengthened through interactive strategies such as virtual exchange (VE). This learning model has increased intercultural awareness and problem-solving skills in linguistic tasks (Rahimi & Sevilla-Pavón, 2025, p. 1). In addition, ChatGPT, LLM, and 5G enable personalized learning

* Corresponding Author. Email: ifnaldi1965@iaincurup.ac.id

that can significantly increase student engagement, especially in digital literacy and multimodal production (Higgs & Kim, 2022; Tian, 2024). Other studies show that engagement with technologies such as virtual reality and artificial intelligence promotes the development of communication and empathy skills in complex educational scenarios (Bartyzel et al., 2025; Sarker et al., 2024). Therefore, the utilization of digital and hybrid learning models in environmental literature education needs to be designed by considering the important role of learning motivation, technology adaptation, and speaking skill enhancement strategies as the cornerstones of successful transformative learning.

Previous studies have examined the effectiveness, challenges, and factors that influence implementing blended learning in higher education. Ali et al. (2023) showed that blended learning significantly improved grammar skills more effectively than fully online learning. Learning models with face-to-face and online learning provide better academic outcomes. In addition, K. C. Li et al. (2023) highlighted the challenges lecturers face in implementing hybrid learning, such as low student interaction and high workload, although academics felt technically prepared. Yu et al. (2023) revealed that the adoption of blended learning among university students in China is influenced by perceived usefulness, ease of use, and subjective norms, which significantly affect attitudes and behavioral intentions. Nikolopoulou and Zacharias (2023) added that students generally have a positive perception of post-pandemic blended learning, mainly due to the support of audiovisual resources that reinforce self-directed learning. However, there are still doubts about participation in group work. Meanwhile, Truss and Anderson (2023) emphasized the importance of academic reflectivity and social interaction in successfully implementing blended learning in the business education environment, which can be used as a reference in designing a more adaptive and responsive hybrid pedagogical model.

Various studies have proven the effectiveness of blended learning in improving academic outcomes. However, the gap in this research is that no study has specifically explored integrating environmental literature learning to strengthen speaking skills. In addition, the role of learning motivation as a mediating variable in the relationship between the application of hybrid learning and speaking skills has not been studied in depth. This research presents a novelty by linking digital literacy, motivation, and speaking skills within a contextualized hybrid learning framework. This approach offers a new perspective through the utilization of interactive digital platforms as a space for literary dialectics and the formation of communicative competence.

This study aims to analyze the effect of hybrid learning implementation on students' speaking skills by considering the mediating role of learning motivation. Practically, the research results can be a reference for lecturers in designing literature learning strategies that are more adaptive, interactive, and relevant to the needs of the digital generation. The findings of this study support the development of quality education (SDGs 4) by encouraging inclusiveness and utilization of technology in language learning. In addition, integrating environmental literature in hybrid learning design contributes to increasing ecological awareness, in line with SDG goal 13 on addressing climate change through education.

II. Literature Review

A. Environmental Education

Developing educational approaches responsive to environmental issues has become important in 21st-century Higher Education curricula. These approaches aim to increase learners' ecological awareness and encourage critical and collaborative thinking relevant to global social and ecosystem conditions. Constructivism theory offers a strong foundation. Knowledge is constructed through interaction with the environment and authentic learning experiences (Cobb, 2024, p. 1). Through project-based learning and collaborative discussions, learners understand environmental concepts theoretically and practically apply them in everyday life. The support of technology and digital media further strengthens the dynamics of learning today by creating spaces of interaction that enhance learning satisfaction and teamwork between learners and educators (Sayaf, 2023, p. 1). Such learning environments have been shown to facilitate understanding of complex topics such as ecological literacy and programming (Moons & De Backer, 2013, p. 368).

The application of technology-based learning in the context of environmental literacy is also closely related to social learning theory, which emphasizes the importance of social interaction in shaping behavior and knowledge. Interactive media such as ClassPoint in EFL learning has increased learners' self-efficacy and active learning behavior (Akram & Abdelrady, 2025, p. 1). In addition, agent-based fire evacuation strategies have shown that collective awareness and social knowledge can save lives in crises (Lu & Li, 2025, p. 1). In addition, social interaction-based training has successfully improved healthy behavior competencies in children (Biyikoglu Alkan & Cavusoglu, 2024, p. 488), as well as enriched learning experiences in entrepreneurship (Vankov & Wang, 2024, p. 381). All these research findings suggest that an inclusive, collaborative, and social justice value-based learning orientation can provide stronger outcomes in environmental education, as well as open up space for the development of critical, creative, and empathic thinking skills in the face of global ecological challenges (Attaya & Hilliard, 2023; Fong, 2025).

B. Hybrid Learning

Learning models that combine face-to-face and online interactions open great opportunities for developing literary pedagogy, particularly in environmental education. By utilizing technologies such as virtual discussion platforms,

interactive videos, and collaborative apps, students can access materials from various sources and practice improving their speaking skills in a wider global context. In addition to broadening environmental horizons, this model also reinforces confidence in students through online presentations and cross-cultural discussions that encourage intercultural communication skills (Masa'deh et al., 2025). The application of technology in the classroom, such as the flipped classroom, has also shown an increase in student motivation and academic achievement, especially in language teaching (Evseeva & Solozhenko, 2015). Intelligent technology support, including artificial intelligence and machine learning, has even begun to improve the safety and efficiency of digital learning systems (Liang & Xu, 2025; Mhlongo et al., 2023). These findings emphasize the role of technology in enriching learning experiences that are more interactive and reflective.

Nonetheless, significant challenges remain, such as unequal access to technology among learners. Not all students have adequate digital devices or stable internet connections. This may limit their participation in online learning (Lyzwinski et al., 2024). In addition, successful implementation is strongly influenced by institutional factors such as infrastructure readiness, teacher training, and administrative support (Masa'deh et al., 2025). Research underlines that technology-based cooperative learning significantly improves students' motivation and communication skills, although its impact on language skills is still limited (Hu et al., 2025; Liu et al., 2024). In the framework of Industry 5.0, the integration between human intelligence and cutting-edge technologies such as AI and digital twins is beginning to be applied for more sustainable and personalized learning optimization (Chen et al., 2025). Therefore, the success of hybrid learning strategies may require the attention of educational institutions. Universities must ensure accessibility, provide ongoing technical support, and tailor learning approaches to students' socio-emotional needs.

C. Learning Motivation

The internal and external drive to learn shapes students' engagement with the material. This engagement increases significantly when learners are directly involved in meaningful learning activities, such as technology-based cooperative learning. This has improved students' critical thinking skills, communication, and motivation (Hu et al., 2025, p. 1). Methods such as interactive videos (H5P, Jigsaw) show effectiveness in creating enthusiasm for learning, especially in short-term learning, although traditional lectures remain relevant for long-term retention (Maceiras et al., 2025). Active learning supplemented with writing practice and structured feedback helps learners develop a resilient mindset and growth orientation in learning (Apridayani & Waluyo, 2025; Juanda et al., 2024). Furthermore, Virtual Reality (VR) is beginning to provide immersive learning experiences, spark curiosity, and increase participation in online learning (Santilli et al., 2025).

Motivation grows through practice-based learning strategies, such as the public speaking curriculum implemented in professional training. This strategy significantly improves communication skills after repeated reflective practice and rehearsal (Benning et al., 2025). Lecturers who follow continuous professional development can create an active and student-centered learning atmosphere, strengthening their role as facilitators of learning motivation (Tefera et al., 2025). Self-efficacy, self-regulation, and effective online interaction have also been shown to strengthen learning attendance in foreign language learning contexts (Li & Lau, 2025, p. 1). In a supportive learning environment, learners are motivated to understand the content and encouraged to express themselves communicatively and interculturally. This is an important aspect of global language and literature learning (Munezane, 2025).

D. Speaking Skills

Speaking skills are essential in language and literacy education, especially in environmental literature contexts requiring students to express ideas critically, clearly, and reflectively. Virtual platforms such as Zoom and Google Meet allow learners to practice speaking in various formats, such as debates, presentations, and group discussions that encourage collaboration across geographical locations. Research shows that applying advanced technologies such as ChatGPT and 5G networks in digital learning improves the quality of interaction and personalization of materials, which ultimately supports improving communication skills (Huang et al., 2024; Tian, 2024). In addition, virtual exchanges between students from different cultures have increased intercultural awareness and strengthened their ability to convey ideas in cross-context interactions (Rahimi & Sevilla-Pavón, 2025).

Various technological innovations have proven effective in overcoming barriers to public speaking. VR-based training programs help students develop courage, empathy, and crisis communication skills in a safe and controlled environment (Bartyzel et al., 2025; Williams et al., 2024). Virtual reality has even significantly reduced social anxiety related to public speaking (Ferreira et al., 2024; Laine et al., 2025). In addition to simulated exercises, reflection-based approaches and repeated practice, such as those used in pediatric residency curricula, show positive results in improving speaking fluency (Benning et al., 2025). In a broader pedagogical framework, the integration of GenAI in collaborative and reflective tasks shows that when university students set personal learning goals, their speaking skills develop as transformative agency increases (Yang & Markauskaite, 2025). Therefore, improving speaking skills demands not only practical exercises but also the integration of technology, the reinforcement of intrinsic motivation, and the creation of an inclusive and reflective learning environment.

III. METHODS

A. Research Design

This research design uses a quantitative approach with mediation regression analysis technique to test the indirect effect of hybrid learning implementation on speaking skills through learning motivation as a mediating variable. The research instrument is a closed questionnaire that has gone through the validation process and reliability test, including the constructs of hybrid learning (X), learning motivation (M), and speaking skills (Y). The sample consisted of students who took environmental literature courses selected purposively, with the criteria of having participated in hybrid-based literature learning. Data analysis was conducted using Jamovi software, specifically the mediation module to identify direct, indirect, and total effects between variables as well as the significance of mediation in the model built.

B. Participants

The participants in this study consisted of students of language education study programs from four universities in Indonesia, namely Curup State Islamic Institute, Makassar State University, Padang State University, and University of Timor. The selection of participants from these institutions is based on geographical diversity, socio-cultural background, and the implementation of hybrid learning that has been running in various courses on environmental literature learning. The distribution of participants is shown in Table 1.

TABLE 1
PARTICIPANT CHARACTERISTICS

Demographics		n	Percentage	Cumulative
Gender	Male	302	73.7%	73.7%
	Female	108	26.3%	100.0%
University	Curup State Islamic Institute	105	25.6%	25.6%
	Makassar State University	131	32.0%	57.6%
	Padang State University	53	12.9%	70.5%
	University of Timor	121	29.5%	100.0%
Age	17—19 years old	219	53.4%	53.4%
	20—22 years old	182	44.4%	97.8%
	23—25 years old	9	2.2%	100.0%
Semester	2	155	37.8%	37.8%
	4	219	53.4%	91.2%
	6	30	7.3%	98.5%
	8	5	1.2%	99.8%
	>8	1	0.2%	100.0%

The four universities represent higher education contexts in the western, central and eastern regions of Indonesia, allowing researchers to explore more comprehensive and contextualized learning dynamics. In addition, students from these various study programs are considered relevant because they have followed a digital-based learning process and have a direct relationship with the development of speaking skills in the context of literary literacy and environmental issues.

C. Data Collecting and Instruments

Data collection in this study was conducted through online questionnaire distribution using the Google Form platform. The research instrument was a closed questionnaire consisting of 12 items designed to measure students' level of hybrid learning utilization, learning motivation, and speaking skills. The data collection process began with selecting short stories with environmental themes. Next, students read the short story independently and randomly chose one of several triggering questions. After that, students presented their ideas and opinions in a hybrid discussion session (face-to-face and online) before finally filling out the questionnaire provided as a form of reflection and assessment of the learning experience.

D. Validity and Reliability of Instrument

The instruments used in this study meet the validity and reliability requirements. Based on the validity test, all items have a significance value <0.001, and the Pearson correlation coefficient ranges from 0.512 to 0.869. The validity test is presented in Table 2 below.

TABLE 2
INSTRUMENT VALIDITY TESTING

Item No.	Sig.	Pearson Correlation	Item No.	Sig.	Pearson Correlation
HL1	< .001	0.724**	SS1	< .001	0.669**
HL2	< .001	0.759**	SS2	< .001	0.853**
HL3	0.007	0.512**	SS3	< .001	0.844**
HL4	< .001	0.765**	SS4	< .001	0.825**
HL5	< .001	0.861**	LM1	< .001	0.847**
HL6	< .001	0.869**	LM2	< .001	0.807**

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

In addition, the reliability test showed that all variables had Cronbach's Alpha values above 0.7, which ranged from 0.809 to 0.846. Thus, this instrument was reliable and consistent in measuring the implementation of hybrid learning, learning motivation, and students' speaking skills. Therefore, it has met the eligibility standards for research data collection. The results of the reliability test can be seen in Table 3.

TABLE 3
INSTRUMENT RELIABILITY TESTING

Variables	Cronbach's Alpha	Results
HL1	0.846	Reliable
HL2	0.809	Reliable
HL3	0.838	Reliable

E. Data Analysis

The data analysis of this study was conducted using Jamovi software. This study focused on the mediation regression technique to determine the indirect effect of hybrid learning on speaking skills through learning motivation. Classical assumption tests were conducted before the primary analysis, namely the normality, heteroskedasticity, and linearity tests. The Kolmogorov-Smirnov normality test with a statistical value of 0.0569 and p = 0.141 shows that the data is normally distributed. This is reinforced by the Q-Q Plot presented in Figure 1, which shows the distribution of residual points following the diagonal line consistently, indicating that residual normality is met. The heteroscedasticity tests of the Goldfeld-Quandt (p = 0.090) and Harrison-McCabe (p = 0.111) methods are also insignificant, indicating the absence of heteroscedasticity symptoms. In addition, the results of the collinearity statistics show a VIF of 1.87 and a Tolerance value of 0.533, which means that there is no multicollinearity between the independent variables. Thus, all regression prerequisites are met for mediation analysis, as shown in Figure 1.

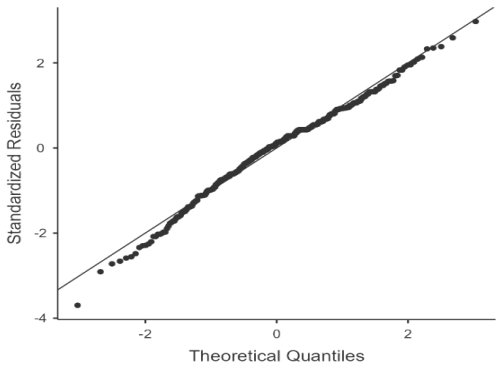

Figure 1. Q-Q Plot

IV. RESULTS

A. Descriptive Statistics

Descriptive statistics were used to describe the data characteristics of the three main variables: hybrid learning implementation, speaking skills, and learning motivation. Each variable was measured using the mean to show the central tendency and the standard deviation to describe the data distribution. The mean calculation results overview the average hybrid learning utilization, learning motivation, and students' speaking skill performance. Meanwhile, the standard deviation helps to understand the level of variation or consistency of respondents' answers to each variable.

TABLE 4
STUDENTS' RESPONSE TOWARDS HYBRID LEARNING (HL)

Item	Statements	Scales					Mean	SD
		5	4	3	2	1		
HL1	How often do you take Environmental Literature lessons through digital (online) platforms?	74	142	132	52	10	3.532	1.005
HL2	How do you rate the learning experience of Environmental Literature using digital media (such as videos, articles and online discussions)?	123	154	123	10	0	3.951	0.834
HL3	Does using online learning platforms help you understand Environmental Literature material better?	127	149	125	8	1	3.959	0.844
HL4	Do you feel more Motivated to learn Environmental Literature through digital / Hybrid learning?	105	169	126	10	0	3.900	0.807
HL5	How effective is the use of video conferencing or online discussions in improving your speaking skills?	109	166	123	12	0	3.907	0.821
HL6	Do you feel more confident talking about environmental issues after taking digital or hybrid learning?	99	157	146	6	2	3.841	0.822

Table 4 shows students' responses to applying hybrid learning in learning environmental literature as measured through six statement items. In general, all items have a mean value above 3.5 with a range between 3.532 and 3.959, indicating the tendency of students' answers to be in a positive category. The item with the highest mean is "the use of online platforms helps understand environmental literature materials" (M = 3.959; SD = 0.844), followed by "learning experience using digital media" (M = 3.951; SD = 0.834), which shows a strong appreciation for the use of technology in understanding the material. Meanwhile, the standard deviations of all items were in the low to medium range (around 0.8-1.0), indicating that students' answers were relatively homogeneous with a modest degree of dispersion. Overall, students responded positively to hybrid learning regarding learning experience, material understanding, increased motivation, and confidence in discussing environmental issues.

TABLE 5
STUDENTS' RESPONSE TOWARDS SPEAKING SKILLS (SS)

Item	Statements	Scales					Mean	SD
		5	4	3	2	1		
SS1	How often do you participate in group discussions or presentations on environmental topics?	106	171	99	33	1	3.849	0.906
SS2	Do you feel that online discussions or presentations improve your speaking skills on environmental issues?	86	194	103	25	2	3.822	0.847
SS3	How easy is it for you to express your opinions or ideas on environmental topics in digital discussions or presentations?	86	181	118	23	2	3.795	0.851
SS4	Do you feel that digital-based learning provides you with the space to develop your speaking skills better than face-to-face learning?	82	191	104	27	6	3.771	0.892

Table 5 shows students' responses to developing speaking skills through digital and hybrid-based learning in the context of environmental topics. All items generally averaged above 3.7, with the highest mean on participation in group discussions or presentations on environmental issues (M = 3.849; SD = 0.906). Students also rated online discussions or presentations as improving their speaking skills (M = 3.822; SD = 0.847), although the expression of ideas in digital forums (M = 3.795; SD = 0.851) and the development of speaking skills through digital versus face-to-face learning (M = 3.771; SD = 0.892) were slightly lower but still positive. The standard deviation from 0.847 to 0.906 indicates moderate response variation among students. However, overall, the responses show a positive trend towards the effectiveness of digital learning in supporting speaking skills, as shown in Table 6.

TABLE 6
STUDENTS' RESPONSE TOWARDS LEARNING MOTIVATION (LM)

Item	Statements	Scale					Mean	SD
		5	4	3	2	1		
LM1	How motivated are you to learn more about Environmental Literature after participating in digital or hybrid learning?	122	200	74	14	0	4.049	0.782
LM2	Do you feel more inspired to communicate about environmental issues after participating in technology-based learning?	108	213	79	10	0	4.022	0.744

Table 6 shows students' responses to their motivation to learn after participating in digital or hybrid-based learning. Both items have mean values above 4, namely 4.049 for motivation to learn more about environmental literature and 4.022 for inspiration to communicate about environmental issues. This indicates a very high level of motivation. The relatively small standard deviations (0.782 and 0.744) indicate that students' responses are relatively homogeneous, with slight variation among the answers. Overall, technology-based learning effectively increases learning motivation and encourages students to communicate more about environmental issues. Furthermore, the collected responses are shown in Figure 2.

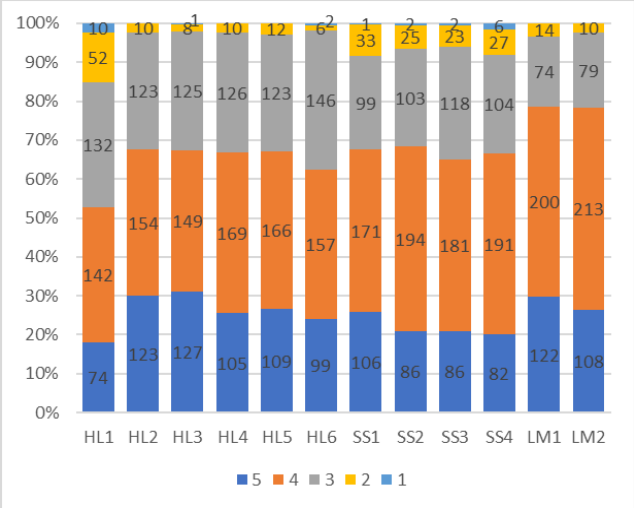

Figure 2. The Compiled Responses

Figure 2 shows the percentage compilation of student responses to all items in the hybrid learning (HL), speaking skills (SS), and learning motivation (LM) variables. Most students gave responses on a scale of 4 for all items. This can be seen from the dominance of orange color in the bar graph, which shows a positive trend towards digital and hybrid learning experiences. Scale 5 is also quite significant, especially on items LM1 and LM2, which indicates the high learning motivation of students after participating in technology-based learning. Meanwhile, the percentage of negative responses (scale 1 and 2) is relatively low across all items. This indicates that most students feel helped and encouraged in learning, speaking skills, and learning motivation through implementing hybrid learning.

B. The Effect of Hybrid Learning on Speaking Skills Through Learning Motivation Mediation

Hybrid learning offers excellent potential to improve students' speaking skills by combining face-to-face and online methods that are more flexible and interactive. In addition, learning motivation plays an important role in strengthening the relationship between the application of hybrid learning and the development of speaking skills. This section outlines how hybrid learning affects students' speaking skills by considering the mediating contribution of learning motivation.

TABLE 7
MEDIATION ESTIMATES

Effect	Estimate	SE	95% Confidence Interval		Z	p	% Mediation
			Lower	Upper			
Indirect	0.162	0.0201	0.123	0.202	8.04	< .001	28.7
Direct	0.403	0.0267	0.351	0.456	15.10	< .001	71.3
Total	0.565	0.0213	0.524	0.607	26.54	< .001	100.0

Table 7 shows the results of the mediation regression analysis between the application of hybrid learning and speaking skills with learning motivation as the mediator. The indirect effect of 0.162 with $p < .001$ shows that learning motivation significantly mediates the relationship, contributing 28.7% to the total effect. Meanwhile, the direct effect of

0.403 was also significant ($p < .001$), contributing 71.3% to the total effect. The total effect of 0.565 with a high significance level ($p < .001$) indicates that implementing hybrid learning as a whole positively and strongly influences speaking skills, both directly and through increasing learning motivation, as shown in Table 8.

TABLE 8
PATH ESTIMATES

Path	Estimate	SE	95% Confidence Interval		Z	Sig.
			Lower	Upper		
HL → LM	0.239	0.0126	0.215	0.264	18.94	< .001
LM → SS	0.677	0.0762	0.527	0.826	8.88	< .001
HL → SS	0.403	0.0267	0.351	0.456	15.10	< .001

Table 8 shows the results of path estimates in the mediation regression model that examines the relationship between hybrid learning (HL), learning motivation (LM), and speaking skills (SS). The path from HL to LM has an estimate of 0.239 with $p < .001$, indicating that implementing hybrid learning significantly increases students' learning motivation. Furthermore, the path from LM to SS showed an estimate of 0.677 with $p < .001$, indicating that learning motivation has a powerful and significant influence on improving speaking skills. In addition, the direct path from HL to SS is also significant, with an estimate of 0.403 ($p < .001$), indicating that hybrid learning affects motivation and directly strengthens students' speaking skills, as shown in Figure 3.

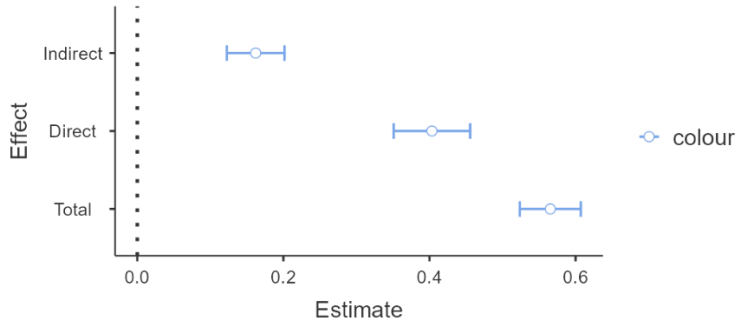

Figure 3. Estimate Plot

Figure 3 displays the estimate plot depicting the indirect, direct, and total effects in the mediation model between hybrid learning, learning motivation, and speaking skills. It can be seen that all point estimates are far from zero with confidence intervals that do not intersect the zero line, indicating that all three effects are significant. The total effect has the most considerable estimated value, close to 0.6, followed by the direct effect at around 0.4 and the indirect effect at around 0.16, reflecting the combined contribution of hybrid learning and learning motivation in improving speaking skills. This visualization confirms that both the direct and indirect effects of hybrid learning on speaking skills are equally important and statistically meaningful.

V. DISCUSSION

The results of this study show that the application of hybrid learning has a significant direct effect on improving students' speaking skills. With a path estimation value of 0.403 ($p < .001$), the more intensive the use of the hybrid learning model, the better the student's ability to convey ideas orally, especially in environmental-themed discussions and presentations. This finding supports the research results of Ali et al. (2023), who found that blended learning is more effective than fully online learning in improving language skills and enriching students' learning experience. In addition, the compatibility of these results with the study of K. C. Li et al. (2023), where despite the challenges in implementing hybrid learning, lecturers' technical readiness still contributed to creating a learning experience that strengthened students' competencies. Support for the effectiveness of hybrid learning in shaping speaking skills is also reinforced by the findings of Truss and Anderson (2023), who emphasize the importance of academic reflectivity and social interaction in creating adaptive blended learning practices in higher education. Knowledge is built through interaction with the environment and authentic learning experiences (Cobb, 2024, p. 1). Technological support and digital media further strengthen the dynamics of learning today by creating spaces of interaction that enhance learning satisfaction and teamwork between learners and educators (Sayaf, 2023, p. 1). Such learning environments have been shown to facilitate understanding complex topics such as ecological literacy and programming (Moons & De Backer, 2013, p. 368; Juanda & Azis, 2023; Juanda et al., 2024).

In addition to the direct effect, this study also found an indirect effect of hybrid learning on students' speaking skills through the mediation of learning motivation, with an estimated value of 0.162 ($p < .001$), which accounted for 28.7% of the total effect. This result shows that hybrid learning not only enriches the learning experience technically but also is able to arouse students' internal motivation to participate more actively in speaking activities. This finding is in line with

the study of Yu et al. (2023), which revealed that perceptions of the usefulness and ease of use of technology in blended learning positively affect students' attitudes and behavioral intentions. In addition, students' positive perceptions of blended learning, as identified by Nikolopoulou and Zacharias (2023), support the idea that hybrid learning based on audiovisual technology can promote self-directed learning and increase active engagement, which in turn strengthens learning motivation and speaking skills. Thus, learning motivation is a key factor in bridging the application of hybrid learning with developing students' communication skills. In addition to broadening environmental horizons, this model also strengthens confidence in students through online presentations and cross-cultural discussions that encourage intercultural communication skills (Masa'deh et al., 2025). The application of technology in the classroom, such as the flipped classroom, has also shown an increase in student motivation and academic achievement, especially in language teaching (Evseeva & Solozhenko, 2015). Active learning complemented by writing practice and structured feedback helps learners develop a resilient mindset and growth orientation in learning (Apridayani & Waluyo, 2025; Juanda et al., 2024). Furthermore, Virtual Reality (VR) is beginning to provide immersive learning experiences, spark curiosity, and increase participation in online learning (Santilli et al., 2025).

VI. Conclusion

The implementation of hybrid learning is proven to strongly influence students' speaking skills, both directly and through the mediation of learning motivation. The more intensive the use of hybrid learning, the higher the students can express ideas orally, especially in discussions and presentations on environmental issues. In addition, learning motivation is important in strengthening the relationship, where more motivated students show better speaking performance. Overall, hybrid learning enriches students' learning experience and encourages active engagement and continuous improvement of speaking skills.

Practically, the results of this study can be a reference for lecturers in designing literature learning strategies that are more adaptive, interactive, and relevant to the characteristics of the digital generation. The hybrid approach developed based on this research supports achieving quality education (SDGs 4) by promoting inclusive access, technology utilization, and active participation-based learning. In addition, integrating environmental literature themes in the hybrid learning scheme also supports students' ecological awareness, in line with SDG 13 goals related to tackling climate change through value-based education and environmental literacy.

Future research should expand the scope by involving more educational institutions from various geographical and socio-cultural settings to test the generalizability of these findings. In addition, future research can integrate additional variables such as emotional engagement, verbal creativity, or the use of AI-based technology in hybrid learning to see the more profound influence on the development of speaking skills. A longitudinal approach is also needed to evaluate the long-term impact of hybrid learning on the development of student's communication competence in the digital era.

Acknowledgements

This paper was supported by the Rector of the State Islamic Institute of Curup and the Dean of the Faculty of Tarbiyah. The authors would like to express sincere gratitude for their invaluable support and for providing the necessary resources to complete this research. Their encouragement and assistance were crucial in the successful completion of this work.

References

[1] Akram, H., & Abdelrady, A. H. (2025). Examining the role of ClassPoint tool in shaping EFL students' perceived E-learning experiences: A social cognitive theory perspective. *Acta Psychologica*, *254*, 104775. https://doi.org/https://doi.org/10.1016/j.actpsy.2025.104775

[2] Ali, A., Khan, R. M. I., & Alouraini, A. (2023). A Comparative Study on the Impact of Online and Blended Learning. *Sage Open*, *13*(1). https://doi.org/10.1177/21582440231154417

[3] Alotaibi, S., Issa, T., Abu-Salih, B., Aljaafari, M., & Almiani, M. (2025). Digital nudging model for learning management systems: Saudi Arabia perspective. *Heliyon*, *11*(6), e42672. https://doi.org/https://doi.org/10.1016/j.heliyon.2025.e42672

[4] Apridayani, A., & Waluyo, B. (2025). Valuing students' mindsets in essay compositions: Active learning and feedback approaches. *Social Sciences & Humanities Open*, *11*, 101273. https://doi.org/https://doi.org/10.1016/j.ssaho.2024.101273

[5] Attaya, M. K., & Hilliard, L. J. (2023). Applying critical race theory to social and emotional learning programs in schools. *Social and Emotional Learning: Research, Practice, and Policy*, *1*, 100005. https://doi.org/https://doi.org/10.1016/j.sel.2023.100005

[6] Bartyzel, P., Igras-Cybulska, M., Hekiert, D., Majdak, M., Łukawski, G., Bohné, T., & Tadeja, S. (2025). Exploring user reception of speech-controlled virtual reality environment for voice and public speaking training. *Computers & Graphics*, *126*, 104160. https://doi.org/https://doi.org/10.1016/j.cag.2024.104160

[7] Benning, T. J., L, J., Hall, D. J., Homme, Jason HGreenmyer, J. R., Castillo, R. M., & Homme. (2025). Longitudinal Improvement in Public Speaking Skills Through Participation in a Resident Public Speaking Curriculum. *Academic Pediatrics*, *25*(1), 102559. https://doi.org/https://doi.org/10.1016/j.acap.2024.08.004

[8] Biyikoglu Alkan, I., & Cavusoglu, H. (2024). Examining the effectiveness of education based on social learning theory in fostering self-care and social skills in school children: A randomized controlled trial. *Journal of Pediatric Nursing*, *78*, e448–e459. https://doi.org/https://doi.org/10.1016/j.pedn.2024.08.007

[9] Chen, C., Zhao, K., Leng, J., Liu, C., Fan, J., & Zheng, P. (2025). Integrating large language model and digital twins in the context of industry 5.0: Framework, challenges and opportunities. *Robotics and Computer-Integrated Manufacturing*, *94*, 102982. https://doi.org/https://doi.org/10.1016/j.rcim.2025.102982
[10] Cobb, T. B. T.-R. M. in S. S. (2024). *Constructivism in Language Learning and Applied Linguistics*. Elsevier. https://doi.org/https://doi.org/10.1016/B978-0-323-95504-1.00020-X
[11] Evseeva, A., & Solozhenko, A. (2015). Use of Flipped Classroom Technology in Language Learning. *Procedia - Social and Behavioral Sciences*, *206*, 205–209. https://doi.org/https://doi.org/10.1016/j.sbspro.2015.10.006
[12] Fong, J. H. (2025). Financial literacy and household financial behavior in Singapore. *Pacific-Basin Finance Journal*, *90*, 102651. https://doi.org/https://doi.org/10.1016/j.pacfin.2024.102651
[13] Hasnine, M. N., Ueda, H., & Ahmed, M. M. H. (2022). Adaptation of AL-TST active learning model in hybrid classroom: Findings from teaching during COVID-19 pandemic in Egypt. *Procedia Computer Science*, *207*, 3226–3233. https://doi.org/https://doi.org/10.1016/j.procs.2022.09.380
[14] Higgs, J. M., & Kim, G. M. (2022). Interpreting old texts with new tools: digital multimodal composition for a high school reading assignment. *English Teaching: Practice & Critique*, *21*(2), 128–142. https://doi.org/https://doi.org/10.1108/ETPC-07-2020-0079
[15] Hu, D., Chen, J., Li, Y., & Wang, M. (2025). Technology-enhanced content and language integrated learning: A systematic review of empirical studies. *Educational Research Review*, *47*, 100677. https://doi.org/https://doi.org/10.1016/j.edurev.2025.100677
[16] Huang, S., Yang, K., Qi, S., & Wang, R. (2024). When large language model meets optimization. *Swarm and Evolutionary Computation*, *90*, 101663. https://doi.org/https://doi.org/10.1016/j.swevo.2024.101663
[17] Juanda, & Azis. (2023). Dolphin Conservation in Pengelana Laut Short Story: Greg Garrard's Ecocriticism Study. *Theory and Practice in Language Studies*, *13*(9), 2303–2312. https://doi.org/10.17507/tpls.1309.17
[18] Juanda, Azis, Mantasiah, R., Effendri, Y., Putradi, A. W. A., Purba, B., & Afandi, I. (2024). Multilingualism and Cultural Awareness: A Correlational Analysis in Language Education in Indonesian Higher Education. *Language Teaching Research Quarterly*, *42*, 163–187. https://doi.org/10.32038/ltrq.2024.42.10
[19] Juanda, J., Afandi, I., & Yunus, A. F. (2024). Digital Short Story Literacy and the Character of Environmentally Concerned Students. *Journal of Language Teaching and Research*, *15*(2), 415–427. https://doi.org/10.17507/jltr.1502.10
[20] Li, N., & Lau, K.-L. (2025). A two-staged SEM-ANN approach to predict learning presence in online foreign language education: The role of teaching presence and online interaction. *The Internet and Higher Education*, *66*, 101012. https://doi.org/https://doi.org/10.1016/j.iheduc.2025.101012
[21] Liang, X., & Xu, Y. (2025). A novel framework to identify cybersecurity challenges and opportunities for organizational digital transformation in the cloud. *Computers & Security*, *151*, 104339. https://doi.org/https://doi.org/10.1016/j.cose.2025.104339
[22] Liu, Y., Thurston, A., & Ye, X. (2024). Technology-enhanced cooperative language learning: A systematic review. *International Journal of Educational Research*, *124*, 102314. https://doi.org/https://doi.org/10.1016/j.ijer.2024.102314
[23] Lu, P., & Li, Y. (2025). Agent-based fire evacuation model using social learning theory and intelligent optimization algorithms. *Reliability Engineering & System Safety*, *260*, 111000. https://doi.org/https://doi.org/10.1016/j.ress.2025.111000
[24] Lyzwinski, L., Mcdonald, S., Zwicker, J., & Tough, S. (2024). Digital and Hybrid Pediatric and Youth Mental Health Program Implementation Challenges During the Pandemic: Literature Review With a Knowledge Translation and Theoretical Lens Analysis. *JMIR Pediatrics and Parenting*, *7*. https://doi.org/https://doi.org/10.2196/55100
[25] Maceiras, R., Feijoo, J., Alfonsin, V., & Perez-Rial, L. (2025). Effectiveness of active learning techniques in knowledge retention among engineering students. *Education for Chemical Engineers*, *51*, 1–8. https://doi.org/https://doi.org/10.1016/j.ece.2025.01.003
[26] Masa'deh, R., AlQudah, M. Z., Shatnawi, A., Samara, H., Ghasawneh, D., Al_Majali, R. T., & Al-Rahamneh, A. (2025). Digital technologies in business education: a hybrid literature review from the Web of Science database. *On the Horizon*, *33*(1), 72–103. https://doi.org/https://doi.org/10.1108/OTH-09-2024-0057
[27] Mhlongo, S., Mbatha, K., Ramatsetse, B., & Dlamini, R. (2023). Challenges, opportunities, and prospects of adopting and using smart digital technologies in learning environments: An iterative review. *Heliyon*, *9*(6), e16348. https://doi.org/https://doi.org/10.1016/j.heliyon.2023.e16348
[28] Moons, J., & De Backer, C. (2013). The design and pilot evaluation of an interactive learning environment for introductory programming influenced by cognitive load theory and constructivism. *Computers & Education*, *60*(1), 368–384. https://doi.org/https://doi.org/10.1016/j.compedu.2012.08.009
[29] Munezane, Y. (2025). Conceptualizing intercultural communicative competence in higher education in the Japanese context: Insights from language learners, practitioners, and public arena. *Social Sciences & Humanities Open*, *11*, 101205. https://doi.org/https://doi.org/10.1016/j.ssaho.2024.101205
[30] Nikolopoulou, K., & Zacharis, G. (2023). Blended Learning in a Higher Education Context: Exploring University Students' Learning Behavior. *Education Sciences*, *13*(5), 514. https://doi.org/10.3390/educsci13050514
[31] Rahimi, A. R., & Sevilla-Pavón, A. (2025). Scaling up computational thinking skills in computer-assisted language learning (CTsCALL) and its fitness with language learners' intentions to use virtual exchange: A bi-symmetric approach. *Computers in Human Behavior Reports*, *17*, 100607. https://doi.org/https://doi.org/10.1016/j.chbr.2025.100607
[32] Santilli, T., Ceccacci, S., Mengoni, M., & Giaconi, C. (2025). Virtual vs. traditional learning in higher education: A systematic review of comparative studies. *Computers & Education*, *227*, 105214. https://doi.org/https://doi.org/10.1016/j.compedu.2024.105214
[33] Sarker, I. H., Janicke, H., Mohsin, A., Gill, A., & Maglaras, L. (2024). Explainable AI for cybersecurity automation, intelligence and trustworthiness in digital twin: Methods, taxonomy, challenges and prospects. *ICT Express*, *10*(4), 935–958. https://doi.org/https://doi.org/10.1016/j.icte.2024.05.007
[34] Sayaf, A. M. (2023). Adoption of E-learning systems: An integration of ISSM and constructivism theories in higher education. *Heliyon*, *9*(2), e13014. https://doi.org/https://doi.org/10.1016/j.heliyon.2023.e13014

[35] Tefera, T. A., Olkaba, T. T., & Hunde, A. B. (2025). The impact of the higher diploma program in improving the learning environment in the higher education institutions of Jimma and Mattu, Ethiopia. *Social Sciences & Humanities Open*, *11*, 101326. https://doi.org/https://doi.org/10.1016/j.ssaho.2025.101326
[36] Tian, X. (2024). Personalized translator training in the era of digital intelligence: Opportunities, challenges, and prospects. *Heliyon*, *10*(20), e39354. https://doi.org/https://doi.org/10.1016/j.heliyon.2024.e39354
[37] Truss, A., & Anderson, V. (2023). The navigational challenges of a blended learning approach to teaching in business and management. *The International Journal of Management Education*, *21*(1), 100733. https://doi.org/https://doi.org/10.1016/j.ijme.2022.100733
[38] Vankov, D., & Wang, L. (2024). Education program and experiential learning in Chinese entrepreneurship education: A year-long Social Cognitive Theory intervention's impact on self-efficacy and intention. *International Journal of Innovation Studies*, *8*(4), 381–392. https://doi.org/https://doi.org/10.1016/j.ijis.2024.07.002
[39] Yu, T., Dai, J., & Wang, C. (2023). Adoption of blended learning: Chinese university students' perspectives. *Humanities and Social Sciences Communications*, *10*(1), 390. https://doi.org/10.1057/s41599-023-01904-7
[40] Zvereva, V. (2020). Trolling as a Digital Literary Practice in the Russian Language Internet. *Russian Literature*, *118*, 107–140. https://doi.org/https://doi.org/10.1016/j.ruslit.2020.11.005

Ifnaldi is a lecturer at the Faculty of Tarbiyah, State Islamic Institute of Curup, Bengkulu Province. He was born on June 27, 1965 in Nagari Tanjung Bonai, Tanah Datar Regency, West Sumatra Province. Currently, in addition to being a home base lecturer at the Indonesian Language Education Podi S1, he has been teaching at the Postgraduate Program S2 and S3 IAIN Curup since 2014. His research focuses on teaching Indonesian language and literature, his work competencies are mostly in the fields of language teaching, oral literature and culture. Email: ifnaldi1965@iaincurup.ac.id. ORCID iD https://orcid.org/0000-0003-2076-1926

Juanda is a Professor in Language and Literature Education Department, Makassar State University. He was a Doctor of the Doctoral Degree of Jakarta State University, Postgraduate Program, the Language Education Study Program. He is a lecturer in the Faculty of Language and Literature at Makassar State University, Indonesia. He has published international Scopus journal articles entitled Student Mental Health Euphemisms (XLinguage, volume 16, issue 1, 2023); "Digital Short Story Literacy and the Character of Environmentally Concerned Students "Journal of Language Teaching and Research (JLTR) Vol. 15 No. 3. 2024; "Ecoliteracy digital short stories among students in Indonesia" Journal of Turkish Science Education 2024-06-15; "Dolphin Conservation in Pengelana Laut Short Story: Greg Garrard's Ecocriticism Study" in Theory and Practice in Language Studies, 2023. Scopus ID: 57208245845; ORCID iD: https://orcid.org/0000-0003-2058-3314.
E-mail: juanda@unm.ac.id

Afnita is a lecturer at Indonesian Language and Literature Education study program at Universitas Negeri Padang. She completed her doctoral education at Universitas Negeri Jakarta. She currently resides in Padang, West Sumatra. She actively writes books, conducts research, and publishes research articles. Her research focuses on the fields of Indonesian Language Learning and Students' Reading Skills. Email: afnita@fbs.unp.ac.id, ORCID iD: https://orcid.org/0000-0002-5504-1104

Andi Fatimah Yunus was born in Ujung Pandang, South Sulawesi May 11, 1974. She was Postgraduate of the 2022 Masters Program, Indonesian Language Education Study Program, Makassar State University. She was Bachelor of Islamic Religious Education in 1997. Appointed as a lecturer at Makassar State University in 2003. The author has written several books including, Bugis Language Syntax, Bugis Language Morphology, Language Error Analysis, Bugis Language Sentence Formation. The author is also active in conducting research and community service carried out with colleagues. The author teaches at the Regional Language and Literature Education Study Program, Faculty of Language and Literature, Makassar State University. Email: andifatimahyunus@unm.ac.id

Iswan Afandi was born in Wajo on July 1, 1990, and currently serves as a Lecturer - Assistant Expert at Timor University. He completed his undergraduate education at Bosowa University (2012) and Master's and Doctoral degrees at Makassar State University with expertise in Indonesian Language and Literature Education. He actively teaches courses such as Appreciation of Fictional Prose, Drama Appreciation, Sociology of Literature, Psychology of Literature, Semiotics, Cultural Studies, and Directing Techniques. In addition, Dr. Iswan is also active in community service activities, especially in technology-based scientific writing training such as Zotero, Mendeley, and ChatGPT. Email: iswan@unimor.ac.id; ORCID iD: https://orcid.org/0009-0006-0961-4828; Scopus ID: 58870577900