

Assessing Learning Without Borders: A Validated COIL Scale for Teacher Roles, Social Capital and Learner Development

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ABSTRACT Higher education institutions increasingly view internationalisation as a strategic means to enhance global engagement, strengthen soft power, and build international partnerships. However, the high costs associated with physical mobility present significant challenges. Collaborative Online International Learning (COIL) offers a sustainable alternative, yet existing assessment instruments primarily focus on student interactions, teamwork, and peer reflection, overlooking the critical roles of educators and relational networks. This study addresses this gap by developing and validating a comprehensive COIL measurement scale. Drawing on Constructivist Learning Theory, Social Capital Theory, Cognitivism, and Transformative Learning Theory, key constructs underpinning COIL implementation were identified and conceptualised. The scale development process involved item generation, content validation using the Content Validity Ratio (CVR) and Scale Content Validity Ratio (S-CVR), construct validation through Exploratory Factor Analysis, KMO, and Bartlett's tests, and reliability assessment using Cronbach's alpha. The validated scale measures teacher roles, social capital, and learner/professional development, providing a robust tool for evaluating and strengthening sustainable internationalisation initiatives in higher education.

INTRODUCTION

Internationalisation of Higher Education (IHE) is a strategic approach to transforming the higher education landscape by leveraging the advantages of globalisation. Universities across the globe view internationalisation as a strategic means not just for higher education but also for soft power and for building strategic partnerships. Nowadays, internationalisation is closely aligned with a nation's social (Mittelmeier and Yang 2022), cultural (Soulé et al. 2025), political (Woldegiorgis 2024), and economic interests (Bruner 2023). IHE helps students, faculty, researchers, and policy makers across the globe connect and share best practices (Cai and Leask 2026). Internationalisation is often linked to faculty and staff mobility. Mobility may be through semester exchange programs, short-term programs, research collaboration, and grants. Mobility helps share and exchange traditions, language, and values, and aids in showcasing a nation's culture, diversity, and history, thereby high-

lighting a country's cultural identity. Mobility has its own challenges associated with the high cost of travelling, accommodation, and allied expenses, which may put affordability constraints on students, especially from developing and low-income economies (Bamberger et al. 2026).

Digitalisation of IHE gave rise to Virtual Exchanges (VE) and Collaborative Online International Learning (COIL) initiatives as sustainable solutions for mobility. In COIL, participating universities globally leverage technology to engage in international projects (Sharma and Panackal 2025). The process involves two or more educators in different geographic locations collaborating to design a shared syllabus and co-create learning outcomes. When educators receive adequate institutional support, access to appropriate resources, and the autonomy to innovate, they are better positioned to co-create transformative learning experiences. Such experiences contribute to the development of global competencies while encouraging learners to engage collaboratively with complex global issues and shared societal responsibilities (Falasca 2026). Collaborative learning encourages learners to take

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on substantive responsibility of working with peers, placing the accountability on learners. Students discuss with each other, brainstorm, and assimilate information through active engagement and co-labouring (Naicker et al. 2022). COIL enables the development of intercultural competence without the expense of mobility. COIL projects range from four weeks to an entire semester, and they comprise assignments designed to help students connect online and broaden their understanding of a course, and gain global insights.

Theories Supporting COIL and IHE

The constructivist learning theory (Piaget 1952; Vygotsky 1978) is a student-oriented learning theory that aims to involve students and empower them to engage in learning. The theory relies on collaboration, exploration, experimentation, and observation as effective techniques to aid successful learning. The theory is based on five underlying principles that active learning helps build knowledge, social interaction among learners is important for learning to happen, application and experimentation through real-world contexts help improve learning, reflection plays an important role in learning, and mistakes are important to facilitate learning. COIL as a pedagogy builds on the five principles of this theory. Active learning is an integral part of COIL (Falasca 2026), wherein learners are encouraged to participate in an icebreaker, explore information, and draw inferences by comparing practices across participating countries. Virtual social interaction is at the core of COIL practices (Chan 2025), wherein learners are encouraged to form virtual teams and connect via platforms such as WhatsApp, Google Meet, Microsoft Teams, Zoom and Canvas, to interact and share information. Synchronous and asynchronous learning are crucial elements of COIL. The COIL projects are designed with the knowledge that a case study, scenario, or existing challenge may be provided to learners to help them find a solution. At the end of COIL includes a reflection and feedback session where learners and faculty reflect on their COIL experience. During the COIL delivery, challenges such as time zone differences, language barriers, and cultural differences must be navigated.

Social capital theory (Bourdieu 1986; Coleman 1988) is another important theory influencing COIL learning. The social capital theory emphasises so-

cial bonds developed through interactions, knowledge sharing, and active participation among members. This helps build trust and cohesion, providing a sense of ownership and commitment among members. For a COIL project to succeed, it is important to build social capital among participating faculty and learners. COIL encourages faculty to hold virtual meetings to establish the guidelines for the COIL project. This enables knowledge sharing and idea generation, which are then translated into meaningful projects (Sun 2025). Participating learners are provided with an icebreaker at the beginning of the COIL that encourages them to interact informally, exchange ideas, culture, and values, thus building trust. The learners then move on to the main project. Over the period of COIL, the learners are provided with numerous opportunities to interact formally and informally, thus building social capital.

Cognitivist theory of learning (Bruner 1974; Piaget 1970) emphasises the role of the teacher in the learning process. As per the theory, the teacher acts as a guide, structuring content so learners can process and organise information effectively. The teacher designs learning environments to support mental processes. The teacher plays an important role in collaborating on and designing engaging COIL projects that facilitate the exchange of information to understand global practices. During the COIL project, the teacher serves as a facilitator, guiding learners toward achieving the COIL objectives. The role of the teacher also extends to helping address challenges students may encounter and encouraging active participation and motivation among learners. The teacher also has a role in the post-COIL feedback, evaluation, and reflections.

Transformative Learning Theory (Mezirow 2018) focused on learning outcomes. The theory draws a connection between students' experiences that help build job-ready perspectives. The theory demonstrates how students critically reflect on their learning experiences, which helps them change perspectives and, consequently, develop into adaptive professionals capable of handling complex workplace demands. COIL helps students reflect on cultural similarities and differences among participating countries. It helps students broaden their learning horizon by gaining global perspectives. The learnings of COIL help them develop professional abilities that can be applied in the future.

Research Gap

IHE is an important agenda for universities across the globe, and existing research on IHE highlights its importance, practices, forms, and challenges. For IHE to be successful, it must provide equal opportunities for all to participate, as inclusive education is important to ensure widespread internationalisation. Research on COIL shows that COIL began as virtual exchanges with the primary objective of language sharing and learning English. It then expanded to a broader perspective. Despite COIL's many benefits, it is yet to be established as a popular pedagogy. At the implementation stage, COIL is still a novice, with many institutions lacking understanding of COIL or unable to fathom its outcomes. Most existing COIL research is qualitative and relies on case studies, interviews,

and reflections. The existing scales for intercultural competence, online learning, and pedagogy are presented in Table 1, which indicates a need to develop a scale that explicitly captures the key elements of COIL, grounded in the discussed theories.

COIL is slowly gaining prominence as a model for internationalising higher education without physical mobility. Existing scales focus primarily on student interactions, teamwork, and peer reflection. While these tools capture important aspects of the student experience, they overlook the pivotal role of educators, the influence of relational networks, such as social capital, and the effect of these factors on performance. Most of these tools are also based on responses from students who were part of physical mobility, not virtual exchange. Once developed and validated, the scale would provide consistency in measuring COIL outcomes across institutions and countries.

Table 1: Existing scales and points of differentiation

<i>Scale name</i>	<i>Authors and year</i>	<i>Key elements of the scale</i>	<i>Gaps identified</i>
Assessment of Intercultural Competence (AIC)	Fantini and Tirmizi 2006	The instrument was a part of the Federation of the Experiment in International Living (FEIL) project and referred to intercultural competence as “a complex of abilities needed to perform effectively and appropriately when interacting with others who are linguistically and culturally different from oneself” (Fantini, 2006: 12). The key elements included were knowledge, attitude, skills, and awareness.	It is not tailored to the COIL context. It only measures the intercultural competence of students attending the program physically and not in online mode. It does not measure the teacher's role.
The Intercultural Sensitivity Inventory (ICSI)	Bhawuk and Brislin 1992	ICSI specifically measures the cultural constructs of individualism, collectivism, flexibility, and open-mindedness.	The 46-item ICSI was developed and tested with participants at the East-West Centre in Hawaii and graduate students in an MBA program focusing on international business. Hence, it lacks the complexity of COIL. It does not consider the teacher's role.
COIL Perception Scale	Rozo-Garcia et al. 2024	Focuses on student interaction, collaborative teamwork, and peer reflection.	It lacks a teacher role and does not test predictive utility.
Transactional distance scale	Zhang 2003	Focuses on dialogue, structure, and learner autonomy in general online learning	It is not tailored to the COIL context and ignores the intercultural and relational complexity of COIL.
DELES	Walker and Fraser 2005	Focuses on instructor support, active learning, interaction and relevance in distance learning.	It is not developed for international collaboration and has no construct on social capital or professional growth.

Research Objectives

The unique contribution of the paper is the identification and integration of four well-established theories into COIL learning and scale development, that is, the Constructivist Learning Theory, Social Capital Theory, the Cognitivism theory of learning, and the Transformative Learning Theory. The paper reinforces the continued relevance of classical learning theories in today's modern context, particularly within the emerging pedagogy of COIL, thereby highlighting their enduring significance in contemporary education. The developed scale would be appreciated by COIL practitioners worldwide. This would further contribute to theory-building in international education and global learning. With this background, the key objectives of the paper are to:

- RO1:** To identify and conceptualise the key constructs that underpin COIL implementation.
- RO2:** To develop and define appropriate measurement indicators for each identified construct.
- RO3:** To empirically validate the reliability and validity of the identified constructs.
- RO4:** To design and propose a comprehensive measurement scale specifically for assessing COIL.
- RO5:** To examine the predictive utility of the COIL implementation scale through hierarchical regression analysis.

Literature Review

Social Capital and COIL

Social capital is the network of relationships in a society (Putnam 2000). Social capital helps achieve mutual goals through mutual support and cooperation in society. Past literature has also linked social capital with trust and shared understanding. Trust can be directed toward members of one's own group (called bonding capital) or toward people/individuals who are different (called bridging capital) (Baycan 2022). The four aspects of social capital, that is, trust, reciprocity, shared language, and shared vision, significantly improved information quality in virtual communities. A positive association was reported between virtual technology and positive outcomes of bridging and bonding in the formation of social capital (Ali et al. 2023). COIL uses a

social-constructivist educational approach, in which students learn through social interaction and build social capital. The studies specifically examining the role of COIL as an enhancer of social capital are limited, but research indicates that bridging online social capital has a positive, significant effect on academic performance (Salimi et al. 2022). Benstead et al. (2025) conducted a field experiment among students in the UAE and the USA to examine the complex effects of the COIL project on social capital, tolerance, and political engagement.

Role of the Teacher and COIL

The education landscape has evolved with the changing times, and various facets, including academic, technical, and social, are affected. Amidst all these changes, the teacher's role has also been a subject of intense discussion and debate. Today, the role of the teacher has transitioned, and teachers play diverse roles, ranging from mentor, facilitator, and guide to researcher, planner, and assessor. Also, teachers have a strategic role in influencing young minds' perceptions of various aspects of life (Pherali et al. 2025; Zheng and Yu 2024). The dynamically changing academic environment has also affected teachers' outlooks towards academics and teaching (Keiler 2018).

A teacher's level of engagement and motivation plays an important role in achieving COIL outcomes (Skaten and Sortland 2024). Studies have emphasised the importance of capacity building among teachers through training activities, digital literacy development, and partnerships with international institutes to encourage and motivate teachers to participate in COIL (Ekin and Balaman 2024). Quintana-Ordorika et al. (2024) advocated implementing COIL experiences in initial teacher training due to their positive implications for global learning engagement levels and as a pedagogical tool that meets the requirements of 21st century society. Similar results were also reported by Grover et al. (2025) in their study, in which faculty perceived COIL as an innovative pedagogical tool that facilitates professional advancement, enhances student engagement across cultures, and provides global learning opportunities.

Professional Enhancement and COIL

COIL plays a vital role in students' professional development. Professional enhancement involves various dimensions, including intercultural

competencies, digital and communication skills, accountability, and creative thinking (Vahed and Xi'an 2024). Few researchers have also discussed innovative COIL models that could revolutionise pedagogy in the current digital world. These innovative models also promise additional benefits, such as enhanced learning outcomes, deeper global understanding, greater creativity, and opportunities for collaboration (Dorner and Loadman 2024). Dimensions such as intercultural competencies are also reinforced by COIL. Cultural dynamism requires societies to learn, relearn, and unlearn many beliefs and ideas to maintain peace and harmony. Intercultural competency helps people understand and appreciate these differences and, with the right skills, integrate them, leading to positive outcomes. The cross-cultural, collaborative nature of COIL helps learners cultivate this competency. A significant increase in cultural intelligence was reported among students in the COIL project. The development of intercultural competency through COIL was found to have a direct effect on the internationalisation of graduate education (Xu and Lin 2023). Similarly, other competencies, such as critical thinking, are enhanced when students engage in cross-cultural or any other research as part of their COIL project.

RESEARCH METHODOLOGY

The following section presents an insight into the research methodology adopted in the study.

Data Collection

The pilot study was conducted at an undergraduate (UG) institute in India. The institute includes COIL in its curriculum and has been actively designing COIL projects since 2019 with universities in Brazil, the United States of America, the United Kingdom, Germany, and the Philippines. COIL projects were designed across numerous courses, including Organisational Behaviour, Human Resource Management, Marketing Management, Brand Management, Business Accounting, and Workforce Planning. Students in the course were given the option to enroll in COIL, and it was not mandatory. Thus, every course had a blend of students who opted for COIL and those who did not. The data were collected from only those students with COIL experience. Ethical guidelines were

followed while collecting data from students. The institute's ethics committee was approached for ethical approval for the study, which was granted. The respondents participating in the study were briefed on the objectives and assured that anonymity would be maintained. Informed consent was taken from the respondents, and participation in the survey was voluntary. The institute ethics committee clearance (Ref. ID: SIU/IEC/591) was received for data collection, ensuring ethical protocols were followed. The final electronic version of the questionnaire was shared with 325 students, of whom 250 completed and submitted it. The data received was checked for completeness and accuracy. Finally, 220 responses were found to be complete and accurate and were included for further data analysis. Thus, the response rate was 76 percent and the usability rate was 88 percent (Dillman et al. 2009). The sample consists of 108 male and 112 female respondents aged 18-24 years.

Research Instrument and Validity

The questionnaire was designed as the research instrument, structured, and all items for evaluation were rated on a 5-point Likert scale. The final questionnaire was divided into four parts. The first part consists of questions about the respondents' demographic profile. The second part contained five questions on social capital and the COIL construct. The third part contained six questions intended to measure the teacher's role in COIL, and the fourth part consisted of six questions to measure students' professional development due to COIL.

The questionnaire's content validity was assessed using the method developed by Lynn (1986) before it was shared with the students. Content validity helps ensure that the scale accurately reflects all aspects of the subject. Seven experts reviewed the scales for content validity. These experts were academicians who had been part of the COIL process at different levels at their institutions. The values of content validity ratio and scale content validity ratio are shown in Table 2.

Data Analysis

In total, 220 responses from the questionnaire were used for scale development and validation in SPSS 29 and Microsoft Excel. Exploratory factor analysis (EFA), Kaiser-Meyer-Olkin (KMO) measure, and Bartlett's test of sphericity were also used to refine and validate the results further. EFA helps

extract the factor structure during scale development, especially in the early stages of model development. It helps explain the relationship between measured variables (Hair et al. 2019). However, before proceeding with EFA, the factorability of the variables must be assessed using the KMO measure of sampling adequacy and Bartlett's test of sphericity for overall significance of the correlation matrix (Hair et al. 2019). KMO should be >0.6 and Bartlett's test should be significant ($p < 0.05$) to indicate that the data is factorable. The output of the present study indicates a KMO measure of sampling adequacy of 0.932 and a significant Bartlett's test of sphericity ($p < 0.001$). Table 3 showcases these values.

Table 3: Test and result values

<i>Test</i>	<i>Result value</i>
Kaiser-Meyer-Olkin (KMO)	0.932
measure of sampling adequacy	
Bartlett's test of sphericity	Sig<0.001

The three scales used to measure the role of social capital in COIL (SC; 5 items), the role of teachers in COIL (RT; 6 items), and professional

enhancement with COIL (PE; 6 items) were subjected to EFA using principal component analysis. The 17 items loaded onto three factors and together accounted for 76.7 percent of the variance. All factor loadings were greater than 0.5, as shown in Table 4, indicating a strong relationship between the variable and the factor (Cheung et al. 2024).

Cronbach Alpha

Cronbach alpha helps ensure that scales are reliable and internally consistent. A Cronbach's alpha value of greater than 0.7 is usually considered an acceptable threshold (Taber 2018). The Cronbach alphas for the three scales (SC, RT and PE) were 0.887, 0.944, and 0.958 respectively, indicating reliability and internal consistency. The values are shown in Table 5.

Construct Validity

Construct validity helps answer the different theoretical questions about the use of the scale, its working, and other theoretical expectations (Sharma and Sonwaney 2015). Convergent and discrimi-

Table 2: Values of content and scale content validity ratio

Content relevance scale: (1) Irrelevant item; (2) Somewhat relevant; (3) Mostly relevant; (4) Extremely relevant
SC stands for Social Capital
RT stands for the Role of the Teacher
PE stands for Professional Enhancement

<i>Items on the scale</i>	<i>Content validity (proportion of experts who rate the item as 3 or 4 divided by the total number of experts)</i>	<i>Scale content validity ratio (proportion of total items judged as content valid)</i>
SC1	6/7=0.86	5/6=0.83
SC2	5/7=0.71	
SC3	5/7=0.71	
SC4	5/7=0.71	
SC5	7/7=1	
SC6	3/7=0.42	6/7=0.85
RT1	7/7=1	
RT2	6/7=0.86	
RT3	7/7=1	
RT4	5/7=0.7	
RT5	5/7=0.7	6/7=0.85
RT6	5/7=0.7	
RT7	3/7=0.4	
PE6	7/7=1	
PE7	6/7=0.86	
PE8	5/7=0.7	
PE9	5/7=0.7	
PE10	5/7=0.7	
PE11	3/7=0.42	
PE12	5/7=0.7	

Table 4: Rotated component matrix

Items	Components		
	1	2	3
SC1			.801
SC2			.880
SC3			.826
SC4			.775
SC5			.715
RT1		.774	
RT2		.783	
RT3		.794	
RT4		.847	
RT5		.793	
RT6		.786	
PE6	.856		
PE7	.828		
PE8	.785		
PE9	.835		
PE10	.788		
PE12	.727		

Notes: Extraction Method: Principal Component Analysis
 Rotation Method: Varimax with Kaiser Normalisation
 a. Rotation converged in 5 iterations

nant validity are the two subtypes of construct validity. Convergent validity measures how two simi-

Table 5: Cronbach alpha values

Scale	Number of items	Cronbach alpha
SC	5	0.887
RT	6	0.944
PE	6	0.958

Table 6: Construct validity

Scale	Item	Factor loading	Variance	Error	SCR (Squared Construct Reliability)	AVE	Cronbach alpha	MSV
SC	SC1	0.801	0.641601	0.358399	0.89925223	0.6420254	0.887	0.2025
	SC2	0.88	0.7744	0.2256				
	SC3	0.826	0.682276	0.317724				
	SC4	0.775	0.600625	0.399375				
	SC5	0.715	0.511225	0.488775				
RT	RT1	0.774	0.599076	0.400924	0.91231206	0.6344425	0.944	0.529984
	RT2	0.783	0.613089	0.386911				
	RT3	0.794	0.630436	0.369564				
	RT4	0.847	0.717409	0.282591				
	RT5	0.793	0.628849	0.371151				
	RT6	0.786	0.617796	0.382204				
PE	PE6	0.856	0.732736	0.267264	0.91639187	0.64687383	0.958	0.529984
	PE7	0.828	0.685584	0.314416				
	PE8	0.785	0.616225	0.383775				
	PE9	0.835	0.697225	0.302775				
	PE10	0.788	0.620944	0.379056				
	PE12	0.727	0.528529	0.471471				

lar constructs are related, and discriminant validity measures the differentiation between two dissimilar constructs. Convergent validity is established if factor loading is more than 0.5, the composite reliability scale is more than 0.7, and the average variance extracted (AVE) is more than 0.5 (Fornell and Larcker 1981). The present scales pass the convergent validity test as shown in Table 6.

Discriminant Validity

Discriminant validity is established when items do not load on multiple factors, and the average variance extracted (AVE) exceeds the maximum shared variance (MSV). According to Fornell and Larcker's (1981) criterion, discriminant validity is established when the square root of each construct's AVE is larger than its correlation with other constructs. The scales pass the test of discriminant validity where $AVE > MSV$ for each construct, and the square root of SVE is more than the inter-construct correlations. Table 7 demonstrates the discriminant validity, and Table 8 represents the Fornell Marcker Matrix values.

Thus, the three scales proposed for the three constructs were validated by using KMO measure of sampling adequacy, Bartlett's test of sphericity, EFA, Cronbach Alpha, Convergent validity, and Discriminant validity using the Fornell-Larcker matrix.

Table 7: Discriminant validity

Scale	AVE	MSV	AVE should be greater than MSV	Discriminant validity
SC	0.642025	0.2025	0.642025 > 0.2025	Yes
RT	0.634443	0.529984	0.634443 > 0.529984	Yes
PE	0.646874	0.529984	0.646874 > 0.529984	Yes

Table 8: Fornell Larcker Matrix

	SC	RT	PE
SC	0.760034	0.436	0.45
RT	0.436	0.7498	0.728
PEF	0.45	0.728	0.752382

Diagonal = "AVE"

Off-diagonal = Inter-construct correlations

The diagonal value ("AVE") exceeds all the values in its row and column.

The Model

Hierarchical regression helps examine the influence of predictors in a sequential manner. The independent variables are added stepwise to assess the improvement in predictive performance for each variable. In the study, social capital and teacher role were the independent variables used to predict students' professional development through COIL. SPSS 29 was used to develop a hierarchical regression equation with professional enhancement as the dependent variable, the teacher role as the independent variable in Block 1, and social capital in Block 2. The statistical results obtained are shown in Table 9.

A hierarchical multiple regression was conducted to examine whether social capital contributes to predicting professional development, while accounting for teachers' roles. In Model 1, the teacher role alone accounted for 53 percent of the variance in professional development ($R^2 = 0.530$, $p < 0.001$), indicating a strong and significant effect. In Model 2, social capital was added, resulting in a small but significant increase in explained variance (R^2 change = 0.022, F change (1, 217) = 10.558, $p = 0.001$). The overall model explained 55.2 percent of the variance ($R^2 = 0.552$, adjusted $R^2 = 0.548$, and $p = 0.001$), as shown in Tables 10 and 11.

In the final model (Model 2), both the role of teacher (Beta=0.656, $p < 0.001$) and social capital (Beta=0.164, $p = .001$) were significant predictors, indicating that both the role of teacher and social capital play an important role in predicting professional enhancement in students due to COIL.

Further, Table 11 also shows that the regression model significantly predicts professional development. In Model 1, the teacher's role alone significantly predicted professional development, $F(1,218) = 245.901$, $p < 0.001$, explaining 53 percent of the variance. In Model 2, adding social capital improved the model, $F(2, 217) = 133.620$, $p < 0.001$,

Table 9: Model summary

Model	R	R square	Adjusted R square	Std. error of the estimate	R square change	F change	df1	df2	Sig. F change	Durbin-Watson
1	.728C"	0.53	0.528	0.41644	0.53	245.901	1	218	< .001	-
2	.743G"	0.552	0.548	0.4076	0.022	10.558	1	217	0.001	1.784

Table 10: Dependent variable

Model	Predictor	Unstandardised B	Std. error	Standardised Beta	t	Sig.
1	(Constant)	1.337	0.196	—	6.814	< .001
1	TRT0.693	0.044	0.728	15.681	< .001	
2	(Constant)	1.132	0.202	—	5.594	< .001
2	TRT0.625	0.048	0.656	12.999	< .001	
2	TSC0.133	0.041	0.164	3.249	0.001	

Table 11: ANOVA

<i>Model</i>	<i>Source</i>	<i>Sum of squares</i>	<i>df</i>	<i>Mean square</i>	<i>F</i>	<i>Sig.</i>
1	Regression	42.644	1	42.644	245.901	< .001
	Residual	37.806	218	0.173		
	Total	80.45	219			
2	Regression	44.398	2	22.199	133.62	< .001
	Residual	36.052	217	0.166		
	Total	80.45	219			

hence explaining 55 percent of the variance. This indicates that both the teacher role and social capital statistically explain a significant portion of the variance in the outcome variable.

Hence, hierarchical regression revealed that teacher role significantly predicted professional development, with a beta of 0.656 and $t(N-2) = 12.99$, $p < 0.001$. Adding social capital increased the variance from 53 percent to 55.2 percent, with an R^2 change of 0.22, $p = 0.001$. Adding social capital after the teacher role leads to a statistically significant improvement in the model. Even though the increase is relatively small (2.2%), the F change test shows it is not due to chance. Hence, the model shows the significant role of teachers and social capital in predicting professional enhancements.

DISCUSSION

COIL provides opportunities for sustainable long-term IHE. The research paper was based on four research objectives. In the first objective, the researcher aimed to identify and conceptualise the key constructs that underpin COIL implementation. To attain this objective, the researchers drew on four learning theories as building blocks, along with their COIL experience, to arrive at the constructs. The Constructivist Learning Theory (Piaget 1952; Vygotsky 1978), the Social Capital Theory (Bourdieu 1986; Coleman 1988), the Cognitivism theory of learning (Bruner 1974; Piaget 1970), and the Transformative Learning Theory (Mezirow 1991) were studied in detail. The researchers also brainstormed their own COIL experiences and the feedback they received to arrive at the constructs.

The study's second objective was to identify the measurement indicators for COIL constructs. Table 12 depicts the integration of the theories, researchers' personal experiences, and the measurement indicators.

The third objective of the study was to validate the reliability and validity of the identified constructs. The reliability and validity of scales were verified using a comprehensive process. As a first step, content validity was verified by the content validity ratio and the scale content validity ratio. Construct validity was verified using exploratory factor analysis, the KMO measure of sampling adequacy, and Bartlett's test of sphericity. Cronbach's alpha helped ensure that scales are reliable and internally consistent. Finally, convergent and discriminant validity were assessed by examining correlations with similar constructs and low correlations with dissimilar constructs.

The fourth objective of the study was to design and propose a comprehensive measurement scale specifically for assessing COIL. The comprehensive measurement scale captures three crucial elements of COIL, that is, the role of the teacher, social capital, and professional enhancement after following a detailed and rigorous process of defining the constructs and generating items based on a literature review and testing the reliability and validity. The developed scale is shown in Table 13.

Finally, the scale's predictive utility was tested using hierarchical regression. The analysis showed that the teacher role is a strong and significant predictor of professional enhancement through COIL. Teachers are central to its impact (Pherali et al. 2025), and hence, COIL-specific faculty development programs for capacity building can strengthen COIL in institutes and universities. The statistically significant contribution of social capital also shows that COIL is not just about curriculum or technology but can be an important contributor to building international peer networks (Salimi et al. 2022) and fostering intercultural competence. COIL is a low-cost alternative that can help democratise international education, making it accessible to a larger and more diverse population of teachers and students. The regression anal-

Table 12: Integration of the theories, researchers' personal experiences and measurement indicators

<i>COIL construct</i>	<i>Meaning of the construct</i>	<i>Related Theories</i>	<i>Integration of COIL with theories</i>	<i>Reflections from researchers' COIL experiences</i>	<i>Implications for the study</i>
Social Capital	It represents the network of relations developed through inter-actions and knowledge sharing among different commu-nities. Trust, collaboration, and belongingness are important aspects of social capital.	Social Capital Theory, Constructivist Theory	The social capital theory provided deeper understanding of how virtual interactions between faculty and learners in COIL played an important role in building trust and fostering comfort among participants, which contributed to COIL's success (Chan 2025; Falasca 2026). The constructivist theory emphasises learning that occurs collabo-ratively, through teams, friendships, and personal ties.	Good interactions between learners can help make COIL projects successful. For example, a well-designed icebreaker activity can help set the right tone for interactions. It is important to have teams comprising students from participating universities. A mix of formal and informal discussions helped to build trust. Learners should be encouraged to form friendships to keep them motivated in COIL.	Measurement indicators included trust, belongingness, friendship, and personal ties.
Role of Teacher	Teachers play diverse roles, ranging from mentor, facilitator, guide, researcher, planner, and assessor. Also, teachers have a strategic role in influencing the perceptions of young minds to various aspects of life	Cognitivist Theory of Learning	The role of a teacher in a COIL project is to facilitate the design of learning outcomes, address student challenges, and keep students motivated throughout the project (Sun 2025). The teacher designs learning environ-ments to support mental processes.	A teacher is a facilitator, mentor, and guide in COIL. The role of the teacher is to design simple, engaging COIL projects and keep students mot-ivated in C OIL. Students face time, cultural, and language barriers. The teacher plays a role in helping students navigate these barriers through guidance.	Measurement indicators included the importance of teachers in COIL, understanding of learning outcomes, and the ability to solve challenges students face in COIL.
Professional Enhancement	Professional enhancement involves a range of dimensions, including intercultural competencies, digital and commu-nication skills, account-ability, and creative thinking, among others.	Transformative Learning Theory	The theory, when applied to COIL, helps draw a relation between students COIL experiences and the skills and competence they build (Chan 2025).	It is important to link COIL to a desired outcome; outcomes could include cultural' exposure, enhanced research abilities, soft skills, and student empowerment.	Measurement indicators included soft skills, cultural exposure, and accountability.

Table 13: COIL scale

<i>Construct</i>	<i>Construct and measurement items</i>
<i>Social Capital (SC)</i>	
SC1	COIL has allowed me to form personal ties with students from other countries.
SC2	I think my friendship with the COIL counterparts is long-term and will continue after the project also.
SC3	I think I can use the personnel connection formed via COIL in the future also.
SC4	My COIL partners and I share mutual trust.
SC5	I share a powerful sense of belongingness with my COIL group.
<i>Role of Teacher (RT)</i>	
RT1	The role of faculty is crucial in COIL.
RT2	The faculty has helped me understand the COIL learning outcomes.
RT3	The faculty has motivated me to communicate with the cohort of participating students.
RT4	The faculty has enabled me to overcome language challenges related to COIL.
RT5	The faculty has enabled me to overcome cultural challenges related to COIL.
RT6	The faculty has enabled me to overcome time zone related challenges related to COIL.
<i>Professional Enhancement (PE)</i>	
PE1	COIL has taught me to be patient while communicating with a different cohort of students.
PE2	COIL has given me cultural exposure.
PE3	The activities in COIL have prompted me to think and research.
PE4	The activities in COIL have helped me to compare similarities and differences in cultures.
PE5	COIL has helped me in improving my communication skills.
PE6	I have a sense of accountability to complete my COIL project.

ysis can also help institutions prioritise investments. Thus, faculty development is a significant investment area in encouraging and implementing successful COIL. The findings reinforce the potential of COIL as a scalable and inclusive model of internationalisation, especially where traditional mobility is financially and logistically constrained. By empirically demonstrating how teacher involvement and social capital contribute to professional enhancement, the researchers provide a model that can guide institutions in embedding global learning in the curriculum by leveraging technology without the cost of physical mobility. COIL can be one of the tools to advance equitable and high-quality education globally by acknowledging, appreciating, and empowering teachers, who are key enablers of its success.

While the findings support the validity and reliability of the proposed COIL scale, they also contribute to ongoing debates within the internationalisation of higher education literature. Existing studies on COIL have predominantly emphasised student learning outcomes (Chan 2025; Farnen et al. 2026), intercultural competence (Fukkink et al. 2024; Skidmore 2026), and virtual collaboration (Salimi et al. 2022), often treating educators as

facilitators rather than central agents in the learning process. In contrast, the present study identifies teacher roles as a critical dimension of successful COIL implementation, a finding supported by the strong predictive influence of TRT on professional enhancement. This challenges narrower perspectives that prioritise student interaction alone and aligns with emerging scholarship advocating a more holistic understanding of virtual internationalisation. Furthermore, the inclusion of social capital as a validated construct extends the literature by demonstrating that the effectiveness of COIL is shaped not only by pedagogical design but also by the quality of relationships, trust, and collaborative networks developed among participants. The present findings suggest that successful COIL initiatives require both educator engagement and supportive relational networks, highlighting the importance of institutional investment and capacity-building.

From a policy perspective, the validated scale provides higher education institutions and policymakers with a practical tool for evaluating the effectiveness of internationalisation-at-home initiatives. As universities increasingly seek sustainable and inclusive alternatives to mobility-based

internationalisation, the scale can inform quality assurance frameworks, faculty development programs, and strategic planning efforts. By enabling systematic assessment of teacher roles, social capital, and learner development, the scale supports evidence-based decision-making and contributes to broader policy goals related to equitable access, global competence development, and sustainable internationalisation in higher education.

CONCLUSION

The study resulted in the development and validation of a comprehensive scale for assessing Collaborative Online International Learning (COIL) initiatives. By incorporating the dimensions of teacher roles, social capital, and learner/professional development, the scale offers a holistic framework for evaluating the effectiveness of COIL programs. The hierarchical multiple regression analysis demonstrated that Teacher Role in Transnational/Transformative Learning (TRT) is a strong and significant predictor of Teacher Professional Enhancement (TPE). In Model 1, TRT alone explained 53 percent of the variance in TPE, indicating its substantial influence on professional development outcomes. The addition of Teacher Social Capital (TSC) in Model 2 significantly improved the model, contributing an additional 2.2 percent of explained variance. Both TRT and TSC emerged as significant positive predictors, with TRT exhibiting the strongest effect. The final model accounted for 55.2 percent of the variance in TPE and was statistically significant. These findings suggest that while effective teacher roles are central to enhancing professional development in COIL environments, social capital also plays an important complementary role. Therefore, fostering both educator engagement and collaborative social networks can strengthen professional growth and the overall effectiveness of COIL initiatives. The rigorous validation process established the scale's reliability and validity, making it a robust measurement tool for both researchers and practitioners. The scale contributes to the growing body of literature on internationalisation in higher education by providing a standardised instrument to assess key outcomes of virtual international collaboration. Its application can support institutions in designing, monitoring, and improving COIL initiatives, thereby

advancing sustainable and inclusive approaches to global learning and internationalisation.

RECOMMENDATIONS

This study supports that meaningful international and intercultural learning experiences can be created without physical mobility, reducing the cost and access barriers traditionally associated with study abroad. The study also highlights the role of human connections and pedagogical leadership in promoting educational equity and professional growth. The study highlights the teacher's role and the importance of capacity-building programs that empower teachers to lead COIL programs effectively. The study contributes a validated scale for measuring the human dimensions of COIL. The study supports the theories of socio-constructivist and networked learning in the context of global education. COIL offers the potential to be considered as a cost-effective alternative to traditional student mobility programs. The study provides evidence to support educational institutions' investment in teacher training and digital pedagogy. Prioritising teacher empowerment and cross-cultural engagement can also be considered while drafting more holistic education policies.

Limitations and Future Research Avenues

While this study offers valuable insights into the measurement and predictive modelling of key constructs within Collaborative Online International Learning (COIL), several limitations must be acknowledged. The data were collected at a single point in time, which limits the ability to infer causality between the variables. Longitudinal studies would be required to examine how the teacher's role and social capital influence professional growth over time. The study was conducted with undergraduate students in India. Further validation across diverse geographic and institutional contexts is recommended. In light of the above, future research can explore several avenues to further advance COIL's potential as a tool for inclusive and equitable global education. Longitudinal studies may be undertaken to examine the impact of COIL on professional development over time. Studies may also explore other constructs, such as collaboration dynamics, the role of technology, and

infrastructure requirements, and their effects on COIL implementation.

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