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Development and Validation of a Belonging-Supportive Deep Learning Environment Instrument for Evaluating Flipped Learning Environments in Higher Education

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ABSTRACT
Supportive learning environments are central to student engagement, psychological well-being, and academic success in higher education. In flipped learning, however, pedagogical effectiveness depends not only on pre-class exposure and in-class active learning but also on whether students perceive the learning environment as socially inclusive, academically supportive, and conducive to deep learning. This study developed and validated the Belonging-Supportive Deep Learning Environment (BSDLE) instrument as an indicator of learning-environment effectiveness in higher education. The study used an instrument-development design with a quantitative validation phase involving 1,161 students from five Indonesian higher education institutions that had implemented flipped learning. Instrument development involved literature review, construct mapping, item generation, expert judgment, and psychometric evaluation. Data were analyzed using a multidimensional Rasch framework. Model comparison showed that the Partial Credit Model (PCM) provided a better fit than the Rating Scale Model (RSM), as indicated by lower final deviance, Akaike Information Criterion, and Bayesian Information Criterion values. Item difficulty ranged from -0.79 to 0.72 logits, and all item fit indices were within the acceptable mean-square range of 0.5 to 1.5. Five BSDLE dimensions demonstrated high EAP/PV reliability (> .90), whereas the faculty-relations dimension showed lower reliability (.695), indicating the need for further refinement. Rating-scale diagnostics suggested that a four-category response format was generally more stable than a five-category format, although several items required revision because of non-monotonic category functioning. Overall, the BSDLE instrument provides promising validity evidence for evaluating belonging-supportive and deep-learning-oriented environments in flipped higher education, while further testing across broader institutional contexts is recommended.

Keywords: belonging; deep learning; flipped learning; higher education; learning environment; multidimensional Rasch model; psychometrics; scale development

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INTRODUCTION

The quality of the learning environment is a major determinant of student engagement, motivation, and academic development in higher education. Learning environments include more than physical facilities; they encompass pedagogical structures, interaction patterns, teacher support, peer relationships, perceived equity, and the broader institutional climate in which learning occurs (Fraser, 1998; Strayhorn, 2019). In contemporary higher education, these relational and pedagogical conditions have become increasingly important because students are expected to participate actively, collaborate with peers, regulate their learning, and construct knowledge rather than simply receive information.

Flipped learning has been widely adopted as an instructional model intended to shift lower-level exposure to content outside the classroom and reserve face-to-face or synchronous time for discussion, problem solving, application, and feedback (Bergmann & Sams, 2012; Zainuddin & Perera, 2019). Meta-analytic and review evidence indicates that flipped learning can improve learning outcomes when it is supported by purposeful instructional design, meaningful pre-class preparation, and active in-class engagement (Akçayır & Akçayır, 2018; van Alten et al., 2019). Nevertheless, flipped learning is not automatically effective. Students may experience isolation, uneven participation, inadequate preparation, and reduced motivation when the social and affective dimensions of the learning environment are neglected.

A sense of belonging is especially relevant in this context. Belonging refers to students' perceptions that they are accepted, valued, included, and supported within academic and social settings (Freeman et al., 2007; Pedler et al., 2022; Strayhorn, 2019). Previous studies have associated belonging with motivation, engagement, persistence, academic confidence, well-being, and student retention (Pedler et al., 2022; van Gijn-Grosvenor & Huisman, 2020). In flipped learning, belonging may be a particularly important condition because much of the learning process depends on interaction, peer collaboration, discussion, and learner autonomy.

The Belonging-Supportive Deep Learning Environment (BSDLE) construct integrates these concerns by conceptualizing an effective flipped learning environment as one that simultaneously supports social connection, academic support, active engagement, investigation, cooperation, and constructive faculty-student relationships. This construct also aligns with the deep-learning orientation in higher education, where learning is characterized by meaning-making, integration of ideas, application, and critical engagement rather than surface-level memorization (Biggs & Tang, 2011; Cavanagh, 2016).

Although many learning-environment instruments have been developed, there remains a need for instruments that specifically capture belonging-supportive and deep-learning-oriented features of flipped learning environments. Moreover, international psychometric standards emphasize that instrument validity should be supported by evidence regarding content relevance, internal structure, response processes, reliability, and score interpretation (AERA et al., 2014; Boateng et al., 2018; DeVellis, 2017). The present study addresses this gap by developing and validating the BSDLE instrument using a multidimensional Rasch framework. The main objective was to obtain validity and reliability evidence for a measurement model that can function as an indicator of learning-environment effectiveness in higher education.

Literature Review and Conceptual Framework

1. Belonging and Supportive Learning Environments

Belonging is a relational and affective construct that reflects students' subjective experience of being valued and included in an academic community. In the classroom, belonging is shaped by teacher behavior, peer acceptance, fairness, participation opportunities, and institutional support (Freeman et al., 2007; Strayhorn, 2019). A belonging-supportive environment is therefore not limited to emotional comfort; it is a measurable condition that can influence motivation, engagement, participation, and persistence.

Learning-environment research has long emphasized the value of students' perceptions as indicators of classroom quality. Fraser (1998) argued that learning-environment instruments are useful because they capture dimensions of classroom life that are often invisible in achievement data alone, including interpersonal relationships, cooperation, task orientation, equity, and involvement. Within higher education, these dimensions are increasingly relevant because effective learning requires interactional trust and psychological safety.

2. Flipped Learning and Deep Learning

Flipped learning reorganizes the temporal structure of instruction: students first encounter learning materials before class and then use class time for active learning, dialogue, problem solving, feedback, and application (Bergmann & Sams, 2012). When implemented well, flipped learning can support competence, autonomy, and relatedness, which are important motivational conditions for student engagement (Zainuddin & Perera, 2019). However, flipped learning also imposes additional demands on students, such as self-regulation and preparation before class. A supportive learning environment is therefore needed to prevent flipped learning from becoming merely a shift of workload from class to home.

Deep learning refers to learning processes that promote conceptual understanding, integration, critical thinking, and application. In higher education, deep learning is supported when instructional design, assessment, and learning activities are constructively aligned with intended outcomes (Biggs & Tang, 2011). In a flipped environment, deep learning requires not only well-designed materials and learning tasks but also belonging-supportive interactions that encourage students to ask questions, cooperate, investigate problems, and persist through cognitive challenge.

3. Psychometric Validation of the BSDLE Construct

The BSDLE construct was operationalized as a multidimensional measurement model. In line with scale-development recommendations, instrument development should begin from construct definition, item generation, expert review, and empirical validation (Boateng et al., 2018; DeVellis, 2017). Because BSDLE consists of several theoretically related but distinct dimensions, a multidimensional Rasch model is appropriate for evaluating item quality, construct coherence, and response-category functioning (Adams et al., 1997; Boone et al., 2014).

Rasch models support the transformation of ordinal item responses into interval-level estimates and provide diagnostic information about item difficulty, person reliability, item fit, and rating-scale functioning. For polytomous items, the Rating Scale Model assumes common thresholds across items, whereas the Partial Credit Model allows item-specific category thresholds (Andrich, 1978; Masters, 1982). Comparing these models is therefore essential when validating Likert-type instruments that may not share identical category functioning across items.

METHODS

This study employed an instrument-development design with a quantitative psychometric validation phase. The development procedure followed a research-and-development logic: defining the construct, reviewing related instruments and theory, generating item indicators, conducting expert judgment, administering the instrument to students, and evaluating the measurement model. The validation phase was conducted from March to September 2025.

The respondents consisted of 1,161 students from higher education institutions that had implemented flipped learning. The institutions were Universitas Negeri

Jakarta, UIN Syarif Hidayatullah Jakarta, Universitas Teknologi Nusantara, Universitas Pamulang, and Universitas Terbuka. These institutions provided a relevant empirical context because the target construct concerns students' perceptions of belonging-supportive learning environments in flipped learning implementation.

The BSDLE instrument was developed from theoretical constructs related to belonging, learning environments, and deep learning. Initial item construction considered dimensions such as student cohesiveness, teacher support, involvement, investigation, task orientation, cooperation, equity, university affiliation, institutional support and acceptance, and faculty/staff relations. The operational version analyzed in this manuscript focused on six retained dimensions: Student Cohesiveness (SC), Teacher Support (T), Involvement (IN), Investigation (IV), Cooperation (CO), and Faculty/Staff Relations (FR). Expert judgment was used to examine content relevance, construct representation, wording clarity, and readability.

Data were analyzed using a multidimensional Rasch framework. Model comparison between the multidimensional RSM and PCM was based on final deviance, Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC), with lower values indicating better relative fit. Because the PCM allows item-specific thresholds, it was considered more appropriate if empirical category functioning differed across items (Andrich, 1978; Masters, 1982).

Unidimensionality was evaluated for each dimension through principal component analysis of residuals. The raw variance explained by measure was interpreted alongside the unexplained variance in the first contrast. A raw variance explained value of at least 30% is commonly used as a heuristic, while a first-contrast eigenvalue below 2.0 supports the absence of a substantial secondary dimension (Boone et al., 2014; Linacre, 2002).

Item fit was evaluated using unweighted and weighted mean-square (MNSQ) statistics, with values between 0.5 and 1.5 considered productive for measurement. Reliability evidence included EAP/PV reliability and item separation reliability. Rating-scale functioning was examined through category-threshold ordering and monotonicity. Non-monotonic thresholds were interpreted as evidence that respondents did not use adjacent response categories in an ordered manner, indicating the need to collapse categories or revise item wording (Linacre, 2002).

The instrument was intended to support interpretation of learning-environment effectiveness across low, moderate, and high categories. However, final cut scores should be established through an empirical standard-setting procedure, such as expert-based criterion referencing or percentile-based norm referencing. In the present manuscript, the psychometric evidence is reported first; operational score categories should be finalized after a formal standard-setting panel or additional normative analysis.

RESULTS AND DISCUSSION

1. Model Comparison

The multidimensional PCM demonstrated better relative fit than the multidimensional RSM. The PCM produced lower final deviance, AIC, and BIC values, indicating that item-specific category thresholds improved model-data fit. Therefore, the PCM was selected for subsequent analyses.

Table 1. Comparison of multidimensional RSM and PCM

Model	Final deviance	AIC	BIC
RSM	122451.97508	122593.97508	122953.02471
PCM	119199.83921	119555.83921	120455.99179

2. Dimensionality Evidence

Table 2 presents the dimensionality evidence for the six BSDLE dimensions. SC and CO exceeded the 30% raw-variance heuristic, whereas T, IN, IV, and FR were below 30%. However, the unexplained variance in the first contrast was below 2.0 for all dimensions, suggesting no dominant secondary dimension. The results therefore provide acceptable but differentiated evidence of dimensional coherence, with the strongest evidence observed for SC and CO.

Table 2. Unidimensionality diagnostics for BSDLE dimensions

Diagnostic	SC	T	IN	IV	CO	FR
Raw variance explained by measure	31.6%	27.7%	21.2%	28.9%	32.4%	24.5%
Unexplained variance in first contrast	1.37	1.46	1.35	1.40	1.38	1.35

3. Item Difficulty, Fit, and Precision

Item difficulty estimates ranged from -0.79 to 0.72 logits. Unweighted and weighted MNSQ values ranged from 0.79 to 1.15, indicating that all items were within the acceptable fit range of 0.5 to 1.5. Standard errors ranged from 0.02 to 0.03, demonstrating high precision in item estimation.

Table 3. Item difficulty and item fit for the Partial Credit Model

Item	Difficulty	SE	Unweighted MNSQ	Weighted MNSQ
[SC]				
SC1	0.17	0.03	1.04	1.04
SC2	-0.45	0.03	0.99	1.01
SC3	0.69	0.03	1.01	1.01
SC4	-0.57	0.03	1.05	1.05
SC5	0.17	0.03	1.08	1.07
[T]				
T1	0.09	0.03	1.01	1.01
T2	-0.19	0.03	0.97	0.99
T3	-0.10	0.03	0.98	0.99
T4	-0.25	0.03	0.98	0.99
T5	-0.43	0.03	0.97	0.99
T6	0.57	0.03	0.97	0.98
T7	-0.06	0.03	0.97	0.98
T8	0.38	0.03	1.06	1.04
[IN]				
IN1	0.03	0.03	1.00	1.01
IN2	0.10	0.03	0.95	0.97
IN3	-0.21	0.03	1.03	1.04
IN4	-0.01	0.03	1.02	1.01
IN5	-0.10	0.03	0.98	1.00

Item	Difficulty	SE	Unweighted MNSQ	Weighted MNSQ
IN6	0.35	0.03	0.95	0.97
IN7	0.10	0.03	0.95	0.98
IN8	-0.42	0.03	1.09	1.10
IN9	0.00	0.03	1.00	1.02
IN10	-0.07	0.03	0.97	0.98
IN11	0.13	0.03	1.00	1.01
IN12	-0.41	0.03	0.96	0.98
IN13	0.51	0.03	1.04	1.05
[IV]				
IV1	0.42	0.03	1.05	1.05
IV2	0.56	0.03	1.05	1.04
IV3	-0.79	0.03	1.15	1.15
IV4	0.72	0.03	1.08	1.08
IV5	0.00	0.03	1.10	1.09
IV6	0.05	0.03	1.05	1.06
IV7	-0.43	0.03	1.00	1.01
IV8	-0.51	0.03	1.10	1.06
[CO]				
CO1	0.08	0.03	0.92	0.92
CO2	0.08	0.03	0.92	0.93
CO3	-0.11	0.03	0.92	0.92
CO4	0.06	0.03	0.92	0.92
CO5	-0.11	0.03	0.90	0.90
[FR]				
FR1	-0.12	0.02	0.84	0.84
FR2	-0.01	0.02	0.80	0.79
FR3	0.05	0.02	0.80	0.80
FR4	-0.05	0.02	0.86	0.86
FR5	-0.08	0.02	0.85	0.85
FR6	-0.03	0.02	0.86	0.86
FR7	0.07	0.02	0.81	0.80
FR8	0.17	0.02	0.87	0.86

4. Reliability Evidence

Table 4 shows the EAP/PV reliability estimates. Five dimensions showed high reliability, ranging from .931 to .969. The FR dimension showed a lower reliability estimate (.695), indicating that this dimension should be strengthened through item revision, item addition, or further evaluation of content coverage. The overall item separation reliability was .992, suggesting that the instrument items were well differentiated across the latent continuum.

Table 4. Reliability evidence for BSDLE dimensions

Dimension	EAP/PV reliability	Item separation reliability	Interpretation
SC	0.933	0.992 overall	High
T	0.962	0.992 overall	High
IN	0.969	0.992 overall	High
IV	0.961	0.992 overall	High
CO	0.931	0.992 overall	High
FR	0.695	0.992 overall	Requires refinement

5. Rating-Scale Diagnostics

Rating-scale diagnostics indicated that most items functioned more clearly with a four-category structure than with a five-category structure. Thirty-one items were better represented using a four-category Likert format and met the monotonicity requirement, whereas 16 items were retained with a five-category structure. Six items

(CO3, CO5, FR2, FR3, FR7, and FR8) did not meet the monotonicity criterion, suggesting disordered response-category use. These items should be revised and re-tested, or the response categories should be collapsed to improve interpretability.

Table 5. Summary of rating-scale diagnostic findings

Diagnostic component	Finding	Interpretation/recommendation
Overall category functioning	31 items fit better with a four-category Likert structure; 16 items were structured with five response categories.	The four-category response format appears more stable for the operational BSDLE form.
Monotonicity	CO3, CO5, FR2, FR3, FR7, and FR8 did not meet the monotonicity criterion.	Revise item wording, review category labels, or collapse adjacent response categories.
Response labels	0 = strongly disagree; 1 = disagree; 2 = neutral; 3 = agree; 4 = strongly agree.	If four categories are used, the neutral category should be removed or the middle category should be redefined consistently.

Discussion

This study developed and validated the BSDLE instrument as a tool for evaluating learning-environment effectiveness in flipped higher education. The findings provide preliminary support for the instrument's internal structure, item functioning, and reliability. The selection of the multidimensional PCM over the RSM is substantively meaningful because it indicates that the response thresholds were not identical across items. This result is consistent with Rasch theory for polytomous data, where the PCM is preferable when items vary in category functioning (Andrich, 1978; Masters, 1982).

The dimensionality findings require balanced interpretation. The first-contrast eigenvalues were below 2.0 across all dimensions, which supports local unidimensionality. However, the raw variance explained by measure was below the 30% heuristic for T, IN, IV, and FR. This pattern suggests that the dimensions are sufficiently coherent for analysis but that several constructs may benefit from stronger item targeting or more tightly defined indicators. Rather than treating the dimensionality evidence as uniformly strong, future refinement should prioritize dimensions with lower explained variance.

The item-fit evidence was strong. All items produced MNSQ values within the accepted range of 0.5 to 1.5, suggesting that the items contributed productively to measurement. The narrow range of standard errors also indicates a high level of item-estimation precision. These results support the use of the BSDLE instrument for evaluating students' perceptions of belonging-supportive learning environments, especially in institutions that implement flipped learning.

Reliability evidence was generally favorable, although not uniformly so. SC, T, IN, IV, and CO showed high reliability, whereas FR showed substantially lower EAP/PV reliability. This difference is important because the original interpretation that all dimensions exceeded .90 would be psychometrically inaccurate. The FR dimension should therefore be treated as a target for revision. Possible strategies include adding items that represent faculty accessibility, respect, communication quality, academic advising, and perceived support from staff, followed by re-analysis in a new sample.

The rating-scale diagnostics provide a practical contribution. The finding that most items functioned better with four categories suggests that the five-category format may have introduced ambiguity, particularly around the neutral category. Disordered thresholds for CO3, CO5, FR2, FR3, FR7, and FR8 indicate that respondents did not use the categories in the expected ordinal sequence. This problem is common in Likert-type scales and can often be addressed by collapsing adjacent categories, clarifying labels, or revising item wording (Linacre, 2002).

Conceptually, the BSDLE instrument extends learning-environment measurement by integrating belonging, supportive interaction, and deep-learning conditions in the specific context of flipped learning. This is important because flipped learning effectiveness should not be inferred only from instructional design or achievement outcomes. A flipped course can be technically well designed but still fail to support belonging, participation, and deep engagement. The BSDLE instrument can therefore serve as an evaluative bridge between pedagogical implementation and students' lived experience of the learning environment.

6. Implications for Higher Education Practice

For higher education institutions, the BSDLE instrument can support diagnostic evaluation of flipped learning environments. Program leaders and instructors can use dimension-level scores to identify whether students perceive sufficient peer cohesiveness, teacher support, involvement, investigation opportunities, cooperation, and faculty/staff relations. These data can inform interventions such as structured peer collaboration, more explicit feedback routines, inclusive discussion protocols, stronger pre-class guidance, and improved student-support mechanisms.

For curriculum and instructional design, the findings suggest that flipped learning should be evaluated not only through achievement scores but also through psychosocial indicators. A belonging-supportive flipped course should ensure that students know how to prepare before class, feel safe to participate, receive meaningful teacher support, interact constructively with peers, and engage in inquiry-based activities.

Limitations and Future Research

Several limitations should be noted. First, the study involved students from five Indonesian higher education institutions, which supports contextual relevance but limits generalizability to other national and institutional settings. Second, demographic variables and program-level differences were not reported in the available dataset; future studies should examine measurement invariance across gender, discipline, institution, and year level. Third, although the study refers to standard setting, empirical cut-score development was not reported; subsequent research should establish interpretable score categories through expert panels or normative analyses. Fourth, the FR dimension showed lower reliability and should be revised before high-stakes use. Finally, future validation should include convergent, discriminant, predictive, and consequential validity evidence, including relationships with engagement, achievement, well-being, and retention indicators.

CONCLUSION

The present study developed and validated the Belonging-Supportive Deep Learning Environment (BSDLE) instrument as an indicator of learning-environment effectiveness in flipped higher education. The multidimensional PCM provided the best model fit, all items demonstrated acceptable fit and high estimation precision, and most dimensions showed strong reliability. Rating-scale diagnostics indicated that a four-category response format is likely more stable than a five-category format for the operational instrument. The BSDLE instrument is therefore a promising tool for evaluating inclusive, supportive, and deep-learning-oriented environments. Further refinement is needed for the FR dimension and for items with non-monotonic category functioning before broader implementation.

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References

Adams, R. J., Wilson, M., & Wang, W.-C. (1997). The multidimensional random coefficients multinomial logit model. Applied Psychological Measurement, 21(1), 1-23. https://doi.org/10.1177/0146621697211001

AERA, APA, & NCME. (2014). Standards for educational and psychological testing. American Educational Research Association.

Akçayır, G., & Akçayır, M. (2018). The flipped classroom: A review of its advantages and challenges. Computers & Education, 126, 334-345. https://doi.org/10.1016/j.compedu.2018.07.021

Andrich, D. (1978). A rating formulation for ordered response categories. Psychometrika, 43(4), 561-573. https://doi.org/10.1007/BF02293814

Bergmann, J., & Sams, A. (2012). Flip your classroom: Reach every student in every class every day. International Society for Technology in Education.

Biggs, J., & Tang, C. (2011). Teaching for quality learning at university (4th ed.). Open University Press.

Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quiñonez, H. R., & Young, S. L. (2018). Best practices for developing and validating scales for health, social, and behavioral research: A primer. Frontiers in Public Health, 6, Article 149. https://doi.org/10.3389/fpubh.2018.00149

Boone, W. J., Staver, J. R., & Yale, M. S. (2014). Rasch analysis in the human sciences. Springer. https://doi.org/10.1007/978-94-007-6857-4

Cavanagh, S. R. (2016). The spark of learning: Energizing the college classroom with the science of emotion. West Virginia University Press.

De Boeck, P., Cho, S. J., & Wilson, M. (2016). Explanatory item response models. In M. Schweizer & C. DiStefano (Eds.), Handbook of cognition and assessment (pp. 247-266). Wiley. https://doi.org/10.1002/9781118956588.ch11

DeVellis, R. F. (2017). Scale development: Theory and applications (4th ed.). SAGE.

Fisher, W. P., Jr. (2007). Rating scale instrument quality criteria. Rasch Measurement Transactions, 21(1), 1095.

Fraser, B. J. (1998). Classroom environment instruments: Development, validity and applications. Learning Environments Research, 1, 7-34. https://doi.org/10.1023/A:1009932514731

Freeman, T. M., Anderman, L. H., & Jensen, J. M. (2007). Sense of belonging in college freshmen at the classroom and campus levels. The Journal of Experimental Education, 75(3), 203-220. https://doi.org/10.3200/JEXE.75.3.203-220
Linacre, J. M. (2002). Optimizing rating scale category effectiveness. Journal of Applied Measurement, 3(1), 85-106.
Masters, G. N. (1982). A Rasch model for partial credit scoring. Psychometrika, 47(2), 149-174. https://doi.org/10.1007/BF02296272
Pedler, M. L., Willis, R., & Nieuwoudt, J. E. (2022). A sense of belonging at university: Student retention, motivation and enjoyment. Journal of Further and Higher Education, 46(3), 397-408. https://doi.org/10.1080/0309877X.2021.1955844
Strayhorn, T. L. (2019). College students' sense of belonging: A key to educational success for all students (2nd ed.). Routledge.
van Alten, D. C. D., Phielix, C., Janssen, J., & Kester, L. (2019). Effects of flipping the classroom on learning outcomes and satisfaction: A meta-analysis. Educational Research Review, 28, Article 100281. https://doi.org/10.1016/j.edurev.2019.05.003
van Gijn-Grosvenor, E. L., & Huisman, P. (2020). A sense of belonging among Australian university students. Higher Education Research & Development, 39(2), 376-389. https://doi.org/10.1080/07294360.2019.1666256
Zainuddin, Z., & Perera, C. J. (2019). Exploring students' competence, autonomy and relatedness in the flipped classroom pedagogical model. Journal of Further and Higher Education, 43(1), 115-126. https://doi.org/10.1080/0309877X.2017.1356916\