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School Environment Scale: Tool Development and Validation

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Abstract

This article describes the development and validation of a tool to measure the school environment, comprising seven sub-components. Initial item generation employed qualitative inquiry, resulting in 48 matrices. An exploratory factor analysis was conducted on the listed items, resulting in the identification of eight factors. Seven of these factors exhibited Cronbach's alpha values greater than 0.7, while one factor did not meet the expected threshold and was subsequently discarded. Structural Equation Modeling (SEM) was employed, along with Confirmatory Factor Analysis (CFA), to identify items associated with each construct and assess its reliability and validity. CFA was performed on the "measurement model" using AMOS Version 20.0. This model confirmed the hypothesised relationships among constructs. The normed chi-square value was 2.35, indicating a good fit to the model. Additionally, face validity and content analysis were conducted. The final School Environment Scale consists of 40 items measured on a three-point Likert scale (Yes, Undecided, and No) and has been developed and validated. The measures of Composite Reliability, Convergent Validity, and Discriminant Validity confirmed the reliability and validity of the research instrument.

Keywords: Development, School Environment, Scale, Tool, Validation

School Environment Scale: Tool Development and Validation

Introduction

The school environment refers to the overall atmosphere, culture, and conditions in which students learn. The school's environmental conditions can influence students' attitudes and behaviours, including adult monitoring and perceptions of safety, which are linked to the prevalence of bullying and to psychosocial functioning among youths. It encompasses physical infrastructure, teacher-student relationships, peer interactions, and emotional safety, and helps students develop effective study habits. In addition to completing their curriculum, students are exposed to values such as respect, confidence, inclusivity, discipline, and encouragement in a positive environment. The school environment is critical to learning, serving as a foundational driver of student success, engagement, and holistic development. Research indicates that positive school climates are directly tied to higher attendance rates, improved test scores, and increased gradua-

tion rates, while negative environments can hinder academic performance and mental well-being. The school environment strongly influences the learner's learning effectiveness. It encompasses all the activities, physical surroundings, and educational philosophies or knowledge that the student experiences. It is a combination of physical, social, and learning environments (Scott Lee, 2024). It includes all the facilities for effective learning. Spacious classrooms, teaching and learning materials, laboratories, library, multipurpose halls, playground, health care, good drinking water facilities, toilets, and other amenities, along with moral, social, and emotional values, all contribute to the school environment. When a school has all the facilities, it is called a positive environment. The school environment can be studied across various domains, including the physical, psychological, emotional, social, and academic. Given the importance of the school environment, it is essential to assess its conditions and take steps to improve them to achieve the desired results.

Review of Literature

The investigators surveyed school conditions and developed a scale to measure the school environment in the Indian context. They sought to identify dimensions of the school environment by reviewing studies conducted both abroad and in India. Tapia-Fonllem et al. (2020) examined the school environment and identified three major dimensions: physical, social, and academic. Savita and Ksheerasagar (2022) studied perceptions of the school environment, using creative stimulation, cognitive encouragement, permissiveness, acceptance, rejection, and control as sub-constructs. Mudassir Ibrahim Usaini et al. (2015) identified two important dimensions: excellent teacher-student relationships and good school-parent relationships. Amaechina et al. (2019) highlighted that the school learning environment and school physical facilities are important dimensions of the school environment. Bisera Jevtić and Danijela Milošević (2022) suggested that motivation to learn, the teaching process, the application of innovative methods, and interpersonal relationships were

influential dimensions of the school environment.

John Shindler (2018) explored eight dimensions of school climate in his book 'Transformative Leaders' Roadmap to School Excellence': Appearance and Physical Plant, Faculty Relations, Student Interactions, Leadership/Decision-Making, Discipline Environment, Learning Environment, Socio-emotional Culture, and School-Community Relations. Emilia James Oyira et al. (2016) discussed the psychological environment of schools. Balog (2018) examined sub-constructs such as the school's physical environment, human resources, teaching materials, curriculum, training, and instruction. Waldman (2016) highlighted the emotional environment of school and emphasised feelings of safety, support, and respect. Students must receive support and compassion from all members of the academic community, i.e., teachers, classmates, administrators, family, and community members, to achieve academic excellence (Waldman, 2016, www.coursesidekick.com). Odeh, Oguche & Ivagher's (2015) study indicated that school climate, discipline, and physical facilities are significant sub-constructs of the school environment.

A review of related studies sheds light on the various dimensions of the school environment. The researchers searched for a standardised measure of the school environment in the Indian context. The researchers consulted various standardised measurement scales to fulfil the aim of measuring the School Environment, including the subconstructs: Supportive Atmosphere, Promoting Active Learning, Policy toward Emotional Environment, Promoting Creative Environment, Connecting School and Home Environment, Student Participation in Governance, and Physical Environment. However, in the absence of such a measure, the researchers developed their own scale.

A healthy school environment is a basic requirement for bringing about positive changes in students' behaviour and in their acquisition of the necessary skills. Ample research has emphasised the importance of a healthy school environment, where students spend most of

their time. Glen I. Earthman (2002) cites various studies and states that a great deal of learning occurs when the school environment is conducive and well-equipped, since children spend most of their valuable time there.

Methodology

Initial Item Generation for School Environment Scale

The school environment significantly affects students' academic performance. Hence, a triumphant area needs to be scrutinised. The stakeholders of education were examined. The students, teachers, and educationalists were consulted for this purpose. The following 48 metrics were generated from the qualitative inquiry.

Table No 1: Metrics Generated from Qualitative Inquiry

Encourage	Support	Trustworthy	Confidential
Parents Involvement	Feedback	Positive Note	Free Expression
Suggestions	Freedom	Encourage	Work together
Co-operative	Regularity	Punishment	Strict Rules
Bullying	Harassment	Code of Conduct	Behaviour
Regular Time	Recreation & Play	Opportunity	Learning Experience
Competition	Creative Learning	Physical Environment	Contribute
Decision Making	Rise Questions	Discuss Worries	Respectful
Communicate	Participative Organisation	Self-Discipline	Students Counsel
Neat & Clean	Calm	Facilities	Spacious
Congested	Inadequate	Visible	Audio Visual Aids
Furnished	Suitable	Sports & Games	Safe

An exploratory factor analysis was conducted on the words listed above. Eight factors were derived; seven had Cronbach's alpha values greater than 0.7, and one miscellaneous factor did not meet the expected value. Hence, the eighth factor was dropped. The measures are discussed in detail in the questionnaire's reliability section. The following table provides detailed information on the initially generated metrics and the resultant grouped metrics from the exploratory factor analysis. They were named, i.e., given nomenclature, in accordance with the kind of values they were associated with, and they are listed as follows.

Table No. 2: Factors Extracted after Exploratory Factor Analysis

S.No.	Initial Metrics	Nomenclature	Grouped Metrics	Notation
1	Encourage	Supportive Atmosphere	Encourage	A1
2	Parents Invited		support	A2
3	Suggestions		Trustworthy	A3
4	Co-operative		Confident	A4
5	Bullying		Feedback	A5
6	Regular Time	Promoting Active Learning	Co-operative	B1
7	Competition		Freedom	B2
8	Decision Making		Work together	B3
9	Communicate		Relate with community	B4
10	Neat & Clean		Regularity	B5
11	Congested	Policy towards Emotional Environment	Punishment	C1
12	Support		No bullying	C2
13	Feedback		Harassment	C3
14	Freedom		Code of conduct	C4
15	Regularity		Acceptable Behaviour	C5
16	Harassment	Promoting Creative Environment	Recreation & Play	D1
17	Recreation & Play		Opportunity	D2
18	Creative Learning		Completion	D3
19	Rise Questions		Creative Learning	D4
20	Participative Organisation		Learning Activities	D5

21	Calm	Connecting School and Home Environment	Parents Invited	E1
22	Inadequate		Contribute	E2
23	Suitable		Rise questions	E3
24	Trustworthy		Involvement	E4
25	Positive Note	Students Participation in Governance	Communicate	F1
26	Encourage		Free expression	F2
27	Punishment		Participative Organisa- tion	F3
28	Code of Con- duct		Self-discipline	F4
29	Opportunity		Student Council	F5
30	Physical Envi- ronment		Respectful	F6
31	Discuss Wor- ries	Physical Environment	Neat & Clean	G1
32	Self-Discipline		Calm	G2
33	Facilities		Facilities	G3
34	Visible		Congested	G4
35	Sports & Games		Visible	G5
36	Confidential		Audiovisual Aids	G6
37	Free Expres- sion		Furnished	G7
38	Work together		Suitable	G8
39	Strict Rules		Sports & Games	G9
40	Behaviour		Physical Environment	G10

41	Learning Experience	Unidentified (To be omitted)	Positive Note	H1
42	Contribute		Suggestions	H2
43	Respectful		Regular time	H3
44	Students Counsel		Decision Making	H4
45	Spacious		Inadequate	H5
46	Audio Visual Aids		Discussion Worries	H6
47	Safe		Strict Rules	H7
48	Furnished		safe	H8

Confirmatory Factor Analysis

Structural Equation Modelling (SEM) has been used mainly for two purposes. The first is confirmatory factor analysis (CFA), which is applied to identify the items of each construct or variable and to evaluate the reliability and validity of each construct. SEM is a statistical analysis technique developed to analyse the interrelationships among multiple variables in a model. These interrelationships can be expressed as a series of single- and multiple-regression equations (Gopinath et al., 2020). It provides an opportunity to study the interconnectedness among the variables selected for the study (Hair et al., 2013). CFA can be used to examine the relationship between the weed or unwanted items and indicators (“measurement items”). This process is called the “measurement model,” and hypothetical associations among constructs are verified using SEM (Hair et al., 2013).

A two-step approach was adopted to conduct the SEM analysis. Alkhawaldeh (2023.govhttps://pmc.ncbi.nlm.nih.gov › articles ›), cited by 228, has confirmed the same approach as Anderson

& Gerbing (1988). The 1st step included specifying the “measurement model” by identifying interrelationships among observed (indicator) and unobserved (latent) factors. CFA was conducted for the “measurement model” using SEM (AMOS Version 20.0). The 2nd step involved specifying the structural model for the independent and dependent variables to test the hypotheses.

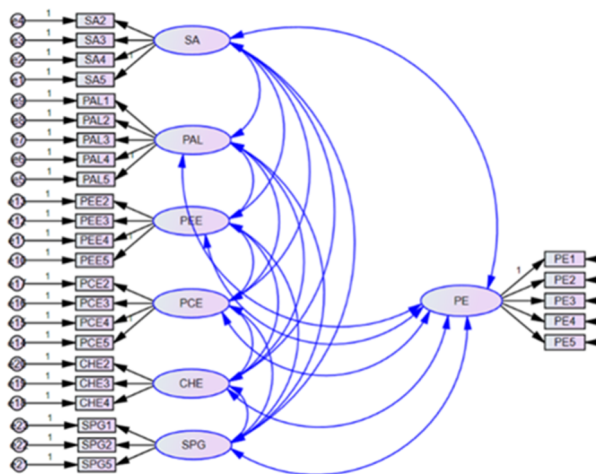


Figure 1 CFA for School Environment Dimensions

SA- Supportive Atmosphere; PAL- Promoting Active Learning; PEE- Policy Towards Emotional Environment; PCE- Promoting Creative Environment; CSHE- Connecting School and Home Environment; SPG- Students' Participation in Governance; PE- Physical Environment

Table No.3: CFA for School Environment Dimensions

Construct	(χ^2) / df	GFI	AGFI	CFI	NFI	RMSEA
School Environment	2.35	0.99	0.97	0.98	0.99	0.06
Recommended Value	≤ 3	$0.8 \leq 1$	$0.8 \leq 1$	$0.8 \leq 1$	$0.8 \leq 1$	≤ 0.08

The table above presents the goodness-of-fit indices for the school environment dimensions. The normed chi-square value of 2.35, which is within the prescribed limit, indicates that the model fits very well. The goodness-of-fit index (GFI) is 0.99, and the adjusted goodness-of-fit index (AGFI) of 0.97 indicates a good fit. The RMSEA value of 0.06 falls within the acceptable range, indicating a good model fit. CFI and NFI are 0.98 and 0.99, respectively, indicating a good fit.

Face Validity and Content Analysis

Based on the literature review, qualitative inquiry, scale development and purification, adapted-cum-altered measures, and other sources of information, the research sub-concepts were identified and incorporated into the scale. Subject-matter experts, psychologists, teachers from reputable schools, and general-knowledge consultants removed unrelated items to improve the quality of the measures. Certain metrics were also added based on their opinions. All their suggestions were carefully incorporated, and Likert's three-point scale was used for scaling. The final School Environment Scale comprised 40 items on a three-point scale (Yes, Undecided, and No) and was developed and validated.

Pilot Study

A pilot study was conducted among students in schools in Tirunelveli between August and October, 2025. A total of 386 students from X and XI classes participated and responded to the research instrument distributed to them after obtaining permission from the respective school heads (Arul Suganthi Agnes & Muthupandi, 2024). The measure was also translated into the regional language to facilitate Tamil-medium students.

Reliability and Validity of the Research Instrument

Reliability

In this study, the reliability of the measurement items was evaluated by assessing the consistency of respondents' responses across all items in the measure, as recommended by Hair et al. (2013). Cronbach's alpha was used to assess the internal consistency of each measure (Adam Khatar, 2016). Nunnally (1978) suggested that Cronbach's alpha reliability coefficients of 0.7 or greater indicate adequate reliability, and Hair et al. (2013) similarly suggested that Cronbach's alpha reliability coefficients of 0.7 or higher indicate adequate internal consistency. Therefore, a minimum cutoff value of 0.7 for Cronbach's alpha reliability coefficients was employed in the present research to determine the reliability of each measure (Gwani AM et al., 2020) and to assess the overall reliability of each latent construct used in the model (Gwani,

Aminu Mohammed, et al., 2020; Silvan Abeka, 2017).

Table No. 4: Construct Reliability and Composite Reliability

S. No.	Construct	Indicators	Reliability	Source
1.	Supportive Atmosphere	5	0.775	EFA
2.	Promoting Active Learning	5	0.820	EFA
3.	Policy towards Emotional Environment	5	0.798	EFA
4.	Promoting Creative Environment	5	0.885	EFA
5.	Connecting School and Home Environment	4	0.713	EFA
6.	Students' Participation in Governance	6	0.754	EFA
7.	Physical Environment	10	0.892	EFA
Composite Reliability 0.89				

Reliability coefficients less than 0.6 were considered poor, 0.7 was acceptable, and those greater than 0.8 were considered good, as suggested by Hair et al. (2013).

Validity

Validity is the degree to which a scale measures what it is intended to measure (Hair et al., 2013). According to Hair et al. (2013), the better the fit between the theoretical latent construct and the measured items, the stronger the evidence for validity. Construct validity can be examined by assessing convergent, discriminant, and nomological validity, which are explained as follows

Construct Validity

Construct validity denotes the extent to which constructs actually measure the intended performance relative to the intended measurement standards. It includes the following:

- Composite Reliability
- Convergent Validity
- Discriminant Validity

Composite Reliability

Usually, the Cronbach coefficient is used to assess the reliability of a survey instrument (Ganeshkumar C., 2013). Only if Cronbach's alpha exceeds 0.60 is the instrument considered reliable. However, the Cronbach value does not assign equal weight to all items in the construct; hence, the reliability results may be biased (Ganeshkumar C., 2013). Therefore, an alter-

native test of composite reliability is needed (Ganeshkumar C., 2013). Composite reliability is computed using the formula given by Ganeshkumar C. (2013).

$$\rho_c = \frac{(\sum_{i=1}^p \lambda_i)^2 \text{variance } A}{(\sum_{i=1}^p \lambda_i)^2 \text{variance } A + \sum_{i=1}^p \theta_i}$$

Table No. 5: Construct Reliability

Constructs	Indicators	Reliability (α)	Composite Reliability
Supportive Atmosphere	5	0.775	0.78
Promoting Active Learning	5	0.820	0.83
Policy Towards Emotional Environment	5	0.798	0.80
Promoting Creative Environment	5	0.885	0.89
Connecting School and Home Environment	4	0.713	0.72
Students' Participation in Governance	6	0.654	0.66
Physical Environment	10	0.692	0.70

Convergent Validity

Convergent validity refers to the degree to which a measurement instrument demonstrates consistency across multiple operationalisations (Ganeshkumar C., 2013). Only variables with convergent validity should be included in the study (Ganeshkumar C., 2013). Items with an Average Variance Extracted (AVE) greater than 0.50 possess convergent validity, and all other items should be dropped. AVE is computed using the formula.

$$AVE = \frac{\sum_{i=1}^n R^2_i}{n}$$

Table No. 6: Assessment of Convergent Validity

Constructs	Indictors	AVE
Supportive Atmosphere	5	0.68
Promoting Active Learning	5	0.63
Policy Towards Emotional Environment	5	0.50
Promoting Creative Environment	5	0.69
Connecting School and Home Environment	4	0.52
Students' Participation in Governance	6	0.66
Physical Environment	10	0.60

Results of convergent validity for each construct are shown in Table 5. From the calculation, all Average Variance Extracted values are greater than 0.5. This clearly shows that the data are well established.

Discriminant Validity

Discriminant validity refers to the independence of the constructs used in the study (Kassiani Nikolopoulou, 2022; Dhevanadhen K. & Muzaffar Ahmad Sofi, 2015). It indicates the degree to which the three constructs used in the study are distinct from one another (Ganeshkumar C., 2013). Constructs studied shall have discriminant validity if the Variance Explained (VE) value of any two constructs exceeds the square of the correlation between them. The results are presented below.

Table No. 7: Square Correlation between Constructs

Constructs	VE	Square Correlation
Supportive Atmosphere	0.51	0.2521
Promoting Active Learning	0.48	0.4489
Policy Towards Emotional Environment	0.58	0.5476
Promoting Creative Environment	0.47	0.2521
Connecting School and Home Environment	0.51	0.2521
Students' Participation in Governance	0.54	0.3845
Physical Environment	0.45	0.3289

Table 7 shows that the Variance Explained (VE) for all constructs exceeds the squared correlations among the constructs. Therefore, it can be concluded that the research instrument used in this study possesses the desired discriminant validity (Ganeshkumar C., 2013).

Conclusion

Parents across India consider their child's school marks the sole measure of their success and excellence. However, this is not entirely true, as a positive school environment influences students' holistic development, helping them see success in both the present and the future. This fact is supported by research from child psychologists, which shows that a positive environment benefits students' motivation, interests, personality, and academic performance. It is most important to study the school environment using a refined research tool.

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