



CONSTRUCTION AND STANDARDIZATION OF LEARNING ENVIRONMENT SCALE

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Abstract

The paper describes the development and standardization of the Learning Environment Scale. The procedure of the development of Learning Environment Scale consists of planning, preparation, item selection, try-out, scoring and item analysis. It has five dimensions viz: technology integration, student engagement, pedagogical practices, transaction of content knowledge, physical learning settings. The original scale consists of 136 items. After discussion with experts and administration on students, the items were reduced to 62. After item analysis, 50 items were retained for the final scale. The test-retest method's reliability was determined to be 0.76. To determine the validity of scale, construct validity was used.

Key Words: Construction, Standardization, Learning Environment Scale.

1. Introduction

The learning environment is a critical determinant of educational success, influencing how students engage with content, interact with teachers and peers, and develop key skills for academic and personal growth. As education systems continue to evolve in response to technological, pedagogical, and social changes, there is a growing need for reliable tools to assess the quality and effectiveness of learning environments. A well-designed learning environment fosters student engagement, supports effective teaching, and promotes meaningful learning experiences.

This paper introduces the Learning Environment Scale (LES)—a structured tool developed to evaluate key aspects of the educational setting from a holistic perspective. The scale is grounded in contemporary educational theories and is designed to measure essential components of the learning environment, including instructional practices, technology use, student participation, content delivery, and physical

infrastructure. By capturing these interconnected dimensions, the LES provides educators, researchers, and policymakers with actionable insights to enhance both teaching and learning.

The following sections of this paper outline the theoretical foundation of the scale, its design and development process, and the methods used to establish its validity and reliability. Through this research, the study aims to contribute a comprehensive, evidence-based instrument for evaluating and improving learning environments across diverse educational contexts.

1.1 Construction methodology of Learning Environment Scale

Before constructing the scale, the previous existing scales were analyzed properly. Experts in the field were contacted. Opinions given by them were taken into consideration.

1.2 Purpose of constructing the scale

The purpose of this scale was to assess how conducive the current learning environment is for student learning.

1.3 Target Population

Learning Environment scale is meant for the prospective teachers.

1.4 Types of items

It consists of items that are to be rate according to your opinion. There is nothing right and wrong in this. Following considerations were given while writing the items

1. Construct each item to asses a single written objective
2. Base each item on a specific problem stated clearly in the stem
3. Include as much of the item as possible in the stem, but do not include irrelevant material
4. State the stem in positive form
5. Word the alternatives clearly and concisely
6. Keep the alternatives mutually exclusive
7. Keep the alternatives homogenous in content
8. Lay out the items in a clear and consistent manner
9. Use proper grammar, punctuation and spelling

10. Avoid using unnecessarily difficult vocabulary

11. Analyze the effectiveness of each item after each administration of the test

Following steps were taken by the investigator during construction and standardization of the test

- Planning of test
- Preparation of test
- Administration of test
- Item analysis
- Standardization of the test
- Reliability
- Validity

2. Planning of test

Planning is the first and most crucial part of organizing any activity. Scale construction also needs careful planning for its construction. Careful planning was done while deciding the sample for which scale was to be made, content and objectives duration, difficulty level, administration procedure and scoring etc. For this, a thorough study of available tools was done. After this a blueprint was prepared.

3. Preparation of the test

Preparation of the test needs intelligent working on the test. It includes mainly three steps:

- Item writing
- Experts Opinion
- Editing of items

After thoroughly analyzing, the investigator prepared a preliminary draft comprising of 136 items. Due consideration was given to objectives of constructing the scale. Each item was given five options to response. Suggestions from experts were taken to and some items were removed from the test and 70 items were retained

4. Administration of the test

4.1 Small group try out: The 70 items scale was given to 30 prospective teachers from St. Thomas College of Education (college not included in the sample for large group try out and experiment). This step in the development of the Learning Environment scale was conducted in order to identify items that

are too difficult for prospective teachers to understand as well as problematic words in the scale. While giving the test to the them, a good rapport was made. They were made to feel at ease by communicating with them. To alleviate the fears about the test, they were informed that the statements had no right or wrong, that they are just their opinions, and that they would not be shared with anybody. They could do the test without any time constraints. After giving these instructions, they were provided with a booklet of 70 items.

As suggested by the prospective teachers, words found difficult were changed with simpler synonyms. The investigator, on the other hand, finds 8 items that need to be eliminated. After making proposed revisions to the items, the Learning Environment Scale, which consists of 62 items, was finalized for large group testing.

4.2 Large group try out: After the preliminary try out, problems faced by the prospective teachers were noted and given due consideration at the time of revision of the second draft. The appropriateness of a test is determined by the care with which the items were chosen. The scale comprised of 62 items was tested on 100 prospective teachers from Aster college of Education. Data collected from Learning Environment scale was recorded for item analysis.

5. Item analysis: Item analysis is a statistical technique for selecting and rejecting test items based on their difficulty and discriminative power. It is used to determine the overall quality of the test as well as the quality of the test items. The goal of the item analysis process is to:

- choose appropriate items for the final draft of the test
- discard weak items that do not add to the test.
- determine the difficulty level of each test item.
- organize the items into three categories: challenging, moderate, and easy
- gives students the ability to be classified based on their ability to complete the tasks
- change the items that need to be changed
- arrange the statements in a logical sequence.
- explain how distractors can be used as alternatives in multiple-choice questions.

This test was in the form of a rating scale, which is designed to secure an expression of opinion for the attribute being tested, hence there were no right or incorrect answers. As a result, the concept of item difficulty does not apply. Here, only the item discrimination index was calculated based on the acquired

results for the current tool construction. The level to which the given items discriminate between the higher and lower groups determines an item's discrimination index. Kelly's dichotomy was employed to determine the higher and lower groups. Kelley (1939) demonstrated that only the tails of the distribution could be used to estimate the product moment correlation between a test item score and the total score, and that the top and bottom 27 percent tails were the most efficient division to use for the analysis. For the current scale, this proposal was followed.

Firstly, the scores of 100 students which was obtained through final-tryout were arranged in descending order of their performance. Then, 27 students i.e. 27% were assigned to the upper group, whereas 27 percent of the students at the bottom, 27 students at the bottom, were assigned to the lower group. In order to find out the discriminative power of the items included in the scale, the mean of every item for the higher and lower group were compared. Below given formula was employed for calculating item discriminative power:

$$\text{Discriminative power} = (\Sigma H - \Sigma L)/(N/2)$$

Where, ΣH = sum of all scores of a particular item responded by higher group

ΣL = sum of all scores of a particular item responded by lower group

N = total number of students in higher and lower group.

Final Draft of the test

The final draft of the Learning Environment Scale was prepared on the basis of item analysis. On the basis of t-value, 12 items of the scale were not retained for the final draft. Final draft contains 50 items.

Scoring Procedure

Each of the five responses would have a numerical value like strongly agree 5, agree 4, not sure 3, disagree 2, and strongly disagree 1 for positive statements whereas for negative statements strongly agree 1, agree 2, not sure 3, disagree 4, and strongly disagree 5. The minimum score on the learning environment scale is 50 which is the total of all the items' minimum score and the highest score 250 is which is the total of all the items' highest score.

6. Standardization Phase It includes:

- Reliability of the scale
- Validity of the scale

- Setting the time limit

6.1 Reliability of scale

Reliability is the consistency of scores of a test. According to Anastasi (1961), “reliability refers to the consistency of scores obtained by the same individuals when re-examined with the same test on different occasions or with different sets of equivalent items or under other variable examining conditions.”

There are different methods to calculate reliability. These are:

- A. Parallel or Alternative method
- B. Split half method
- C. Rational-equivalence method
- D. Test-Retest method

A. Parallel or Alternative method-This method of reliability requires two parallel tests to be administer on the same group. These sets are equivalent in all forms i.e. content, number of items, physical environment etc. In the opinion of Gulikson (1974), “Parallel tests have equal means, equal variances and equal inter-correlations with another.” And in the view of Guilford (1956), “the alternate form method indicates both equivalence of content and stability of performance.” Generally, both the equivalent tests either administered in one sitting of the students or after a short span of time.

B. Split half method

Split half method is the method to estimate the internal consistency of the test. Here, investigator split the single constructed test into two equivalent parts. Commonly used procedure for dividing the test is separating the odd numbered items on one side and the even numbered items on other side. In the way, two sets of a single test are formed. Through this method data required for reliability coefficient is obtained in one time administration of the test. Therefore, Guilford and Fruchter (1973) have defined it as “on-the-spot reliability”. This method of Split half method was not feasible for the present study due to variations of consistency. It might result in variation in correlation coefficient.

C. Rational Equivalence Method

Rational Equivalence method enables to examine the inter-correlation of the items in the test and the correlations of the items with the test as a whole. That is why this method is commonly known as “Inter-Item Consistency”

D. Test-retest Method

Test-retest method is the method to find the reliability of a test, where the single test is administered on the same sample after a reasonable time period. Through this method, two set of scores are obtained. These scores when correlated to give the reliability coefficient value.

In the present study the reliability of the learning environment scale was ensured through test- retest method. The reliability study of learning environment scale was conducted over a sample of 90 students. The second administration of the test was carried out after a gap of three weeks on the same group of students. The product moment coefficient of correlation for the two test scores was found to be .76. This value shows that the test can be considered as reliable.

6.2 Validity of the scale

The degree to which a test measures what it is supposed to measure is known as its validity. It is among the most important aspects of any effective test. It is the prerequisite that must be met before a test may be administered.

In the words of Anastasi (1961), “the question of test validity concerns what the test measures and how well it does so”. According to Cronbach (1960), “validity of a test corresponds to the definition of the trait intended to be measured, or it may be established inductively by naming the traits represented in the items in hand”.

The test was validated against the criteria of construct validity. The values of coefficient of correlation between the item score and the total score of the scale ranges from 0.38 to 0.88. All the values are positive and significant at 0.01 level of significance. The value of the coefficient is average to high for different items showing that items are correlated positively with the whole test hence are suitable for the test.

6.3 Setting the Time limit of Learning Environment Scale

To make sure that there are no inconsistencies during the test-taking process and that the conditions are consistent and the same for every student, test time limitations need to be standardised. The test's duration was set at 30 minutes, which included time for reading instructions and answering the question, based on the average amount of time needed by 75% of examinees to reach the final item.

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