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Impact of Classroom Environment on Students' Science Learning

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Abstract: Schools in different regions have different physical resources and different ways of managing them. Also, the physical resources available in individual classrooms and the way they are arranged vary. It is unique to each classroom and there is a perception that differences in children's learning depend on the physical resources available in the classrooms and their management. That is, it is an important and urgent need to find out about the physical resources in the classrooms and how they affect the students' learning. Therefore, this study was conducted to explore the impact of the classroom environment on science learning in the Badulla Education Zone in Sri Lanka. To achieve this goal, a total of 300 students and 25 teachers from Ordinary Level classes from 21 schools in the Badulla Education Zone were used as respondents. Mixed methods were used for this research. From that, stratified sampling techniques and simple random sampling techniques were used in the quantitative method. The purposive sampling technique was used in the qualitative method. Data were collected from two separate pre-tested questionnaires, interviews, and observations. Similarly, data were analyzed in both descriptively and statistically. According to the results of the analysis, the majority (48%) of teachers are in the 20-30 age group, followed by 24%, over the age of 50, 12% of the 41-50 age group, and 16% in the 31-40 age group. It was reflected that the majority of science teachers are young. Also, 92% of science teachers were women and 8% were men. According to the study's findings, there is a linear correlation between science scores and the classroom environment ($p = 0.017$). Also, the Pearson correlation coefficient (r) is 0.138. That is, confirms that there is a positive correlation between science scores and the classroom environment. The study further revealed that by managing the physical resources in the classroom and locating them properly, children can increase their interest in learning science and advance their educational goals. The findings of this study can be used to guide children's education on an effective and successful path.

Key words: **Correlation, Science score, Classroom Environment, Pearson correlation coefficient**

1.INTRODUCTION

Creating a safe and positive classroom environment is essential for effective teaching and learning. Since students spend most of the day in the classroom, the classroom should be fun for students and a place where they can clearly grasp the information being taught. Furthermore, the classroom environment plays a key role in enabling students to succeed. Tables can be arranged in various patterns like U-shape, line, curve, group etc. However, in this setting, special care is taken to maintain eye contact and use space efficiently. In addition, classroom temperature, ventilation, light and sound levels should be controlled to suit the motivational and teaching environment. (Grubaugh & Houston, 1990). Furthermore, the walls can be decorated with various assignments or items to create an effective learning environment as well as confuse students' knowledge. Furthermore, physical aspects of the classroom such as ventilation, lighting, desk and chair arrangement and spacing are essential to maintain positive comfortable learning conditions for students. Puteh et al. (2015) noted that when the learning environment is conducive and comfortable, student focus increases during the learning process. Also, many parents try to enroll their students in popular schools because of the looks of the school. They believe that the external appearance of the school affects the learning process of the students. Because the nature of classrooms in schools, that is, the distribution of physical resources, is different, it is an urgent need to find out how the nature of classrooms affects children's science learning and how strong that effect is. Because the nature of classrooms affects children's learning, it is important to design classrooms most appropriate for children's learning. Therefore, it is necessary to research it to get a clear understanding of it. This scene planted the seeds for the researcher to research. Thus, the researcher planned to explain the effect of the classroom environment on science learning.

Research question

What is the relationship between classroom environment and students' Science scores?

H1: Classroom environment has a positive effect on students' Science scores

Overall Objective

To recognize the impact of the classroom environment on students' science learning.

Specific Objective

To identify the strength of the effect of the classroom environment for better science learning

Methodology

Selection of Sample

There were two populations used as the student population and the teacher population for this study and two groups used for this research study; the ordinary level student group (2019 O/L) and the science teachers' group as samples. Schools having ordinary level classes were considered as the sample element. Students and teachers were taken as the sample units.

Sampling method

The minimum sample size was calculated using a sampling size calculator (https://stattrek.com/survey-sampling/sample-size-calculator.aspx) and it amounted to 294 students. In the quantitative method, a stratified sampling technique with a proportionate allocation method was used when deciding the number of students that needed to be selected from each school, and those students were selected using a simple random method. All science teachers who taught in the above 21 schools selected were used as the teachers' sample. There were 25 teachers included in this sample as shown in Table 1.

Table 1: Table of sample percentage out of a population

Category	Population	Sample	Sample percentage %
School	72	21	29
Students	2988	300	10
Teachers	147	25	17

A stratified sampling technique was used in the quantitative method and purposive sampling was used across qualitative research designs. Also, randomly selected 15 students in ordinary level classes, and 5 teachers in a selected school were used for the pilot study.

Data collection and Analysis

The Quantitative data collection instrument used for the primary data collection was a pre-tested separate survey questionnaire for students and teachers' groups. In addition, qualitative data collection instruments were semi-structured interviews, informal interviews, and observation techniques were also used to gather primary data. Secondary data was gathered from progress reports, teacher information records, term test mark sheets, the internet, and previous studies. Data were analyzed by using descriptive, and statistical analysis.

Results and Discussion

The analysis of the teacher sample was presented below. Considering the sample of teachers, the diversity in their age, gender, professional and educational qualifications, job satisfaction, and teaching experience can be seen. It is an expression of the diversity of teachers who typically work in the Sri Lankan teaching profession.

- **Age and gender distribution**

The present study included teachers in different age groups. The majority of teachers (48%) belonged to the 20-30 age group followed by 24% in, the above 50 age group, 12% in the 41-50 age group, and 16% in the 31-40 age group (Figure 1). Hence, it reflected that majority of Science teachers were young. Accordingly, in the gender distribution of Science teachers in Badulla Education Zone 92% of Science teachers were females and 8% were males. The Final Report of the Annual School Census of Sri Lanka in 2018 mentioned that there were 74% female and 26% male teachers working as teachers under the Ministry of Education.
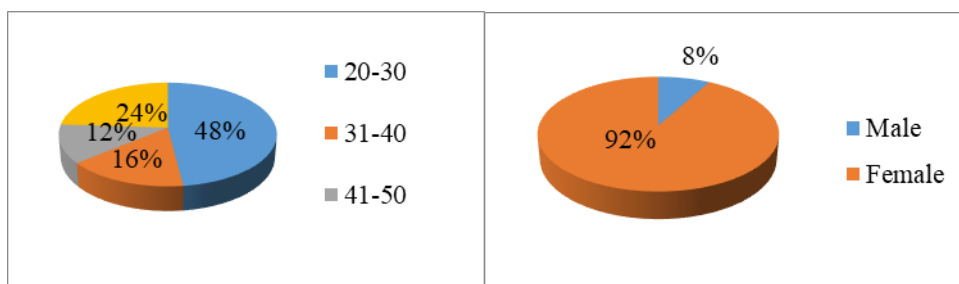
Figure 1: Age distribution and Gender distribution of Science teachers in Badulla Education Zone

There were 126 males and 175 females among the respondents as shown in Table 2.

Table 2: Gender composition of respondents used in the present study

Gender	No. of response	Percentage %
Male	126	41.8
Female	175	58.1

- **Variety of Professional and educational qualifications of teachers**

Teachers had different levels of professional and educational qualifications. The combination of educational and professional qualifications of the teachers in the Badulla Education Zone can be summarized as shown in Table 3. According to Table 3, most graduate teachers (i.e 36%) had completed a postgraduate diploma as a professional qualification. Both teachers in the O/L and other categories were found to have served for more than 20 years. They seemed to be experienced teachers even though they have obtained GCE O/L as their maximum educational qualification.

Table 3: The combination of both educational and professional qualifications of teachers in Badulla the Education Zone

Combination of Educational & Professional Qualification	Number of teachers	Percentage (%)
GCE O/L and Other	2	8
GCE A/L and Diploma	3	12
GCE A/L and Other	7	28
BSc and PGDE	9	36
BSc and MSc	1	4
MSc and PGDE	2	8
BSc and None	1	4
Total	25	100

- **Experience in teaching and teaching Science**

When teaching experience was considered, 60% of the respondents had 6-10 years of service and 16% of teachers had 11-20 years of service (Figure 2). In addition, another 16% of teachers had more than 20 years of experience and the rest 8% had less than 5 years of service.
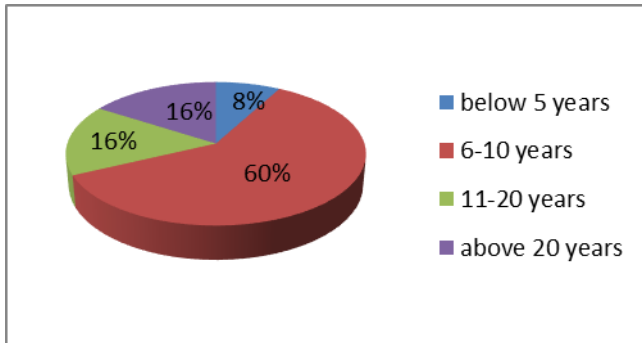
Figure 2: Teaching experience of the Science teachers in Badulla Education Zone

The relationship between classroom environment and students' Science scores?

Creating a safe and positive classroom environment is essential for effective teaching and learning. In this regard, respondents had given different values for the classroom environment and the findings are summarized in Figure 3. The average value for the classroom environment was calculated by using the following equation;

Average value of classroom environment = $\frac{Value\ of\ (D1+D2+D3+D4+D5+D6)}{6}$

Where

D1 is "There are enough chairs and desks in the classroom."

D2 is "The classroom is well ventilated."

D3 is "Adequate space in the classroom."

D4 is "The classroom is well lit."

D5 is "The blackboard/whiteboard is neatly positioned in the classroom."

D6 is "The desks and chairs in the classroom are neatly arranged."

According to the above equation, the maximum average value that can be obtained under the classroom environment parameter is 4 and the minimum value is 0.
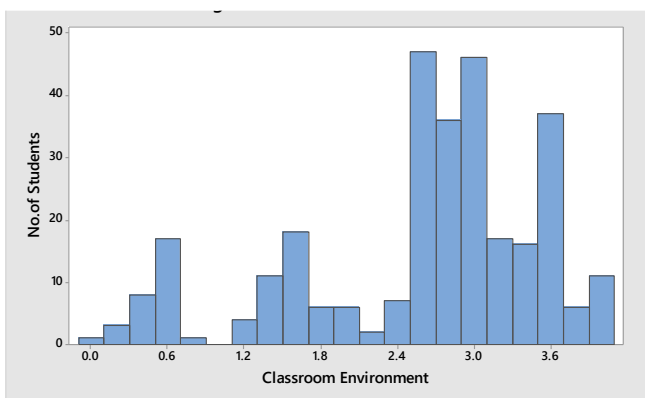

Figure 3: Average value for the classroom environment

According to Figure 3, 227 of 300 respondents (75.42%) had given average and above average values for the classroom environment. Only two respondents had given the minimum value of zero and 10 respondents had given the maximum value (4.0). Further, the highest number of respondents (46; 15.28%) had given an average value of 2.6 for classroom environment of the classroom.

Qualitative analysis results showed that many teachers and students point out that having a classroom with a learning environment contributes to the success of the teaching-learning process. Below are some of their comments. Furthermore, some of the children submitted the following ideas about the classroom environment for Part E of the students' questionnaire,

Respondent 01 (SC 08)

"We do not have a separate classroom. There are three classrooms in the same hall. Sometimes we do not hear what the teacher is teaching."

Respondent 02(SC 16)

"It is very hot because our class was very small. That is why some days it is very difficult for us to learn."

Similarly, some teachers had the following comments on the classroom environment in section D of the teachers' questionnaire.

Respondent 01 (SC 08)
"There is a lot of noise in the classrooms as the classrooms are not separated from each other. It is very difficult for us as well as for the children."

Respondent (SC 1 A)

"Because of the lack of space in the classroom, it is difficult to reach out to children while teaching"

Moreover, Pearson correlation output was obtained using the average Science mark as the dependent variable and classroom environment as the independent variable. Following hypotheses were developed in the present study at a significance level of 95%.

H_0: The classroom environment has no effect on the Science scores

H_4: The classroom environment has a positive effect on the Science scores

According to the findings of the present study, there was a linear correlation between Science scores and classroom environment (p=0.017) as shown in Table 4. In addition, the Pearson correlation coefficient value (r) of the above combination was indicated as 0.138 confirming that there was a positive correlation between Science scores and the Classroom environment. However, it was a weak correlation. Because Kluckow and Evans (1996) mentioned that if the r value is less than 0.4 it is a weak relationship.

Table 4: Pearson correlation values of variables

Combination of Variables	P-value	R-value
Classroom environment vs. students' Science score	0.017	0.138

The following were extracts from interviews held with teachers and students. They were evidence of the above subheading.

"If the classroom is comfortable we can easily learn. Our class is too small. Some desks have two kids. It is very hot and compact. It is very difficult to stay as well as study in class in the evening."
(Informal interview transcript of St 4, Sc 3, 2019.01.11).

"If children have a good learning environment, they will be motivated to learn well. So it is important to create a good learning environment with light, fresh air, and, space."
(Semi-structured interview transcript of Tr, Sc 2, 2019.03.12).

Moreover, the following field notes were attested to the above data.

There is a hall with 3 classes and those classes are not reserved. So there is noise and no separate sounds are clearly heard from the teachers of the three classes. This situation seems to be a problem for the children as well as the teachers. It also seems to be a hindrance to the learning and teaching process.
(Field notes, Sc 8, 2019.03.05)

Although there are not many facilities, the classroom environment is good. The learning environment has been created due to the learning aids displayed on the walls.
(Field notes, Sc 10, 2019.03.05)

Furthermore, the findings of this study were comparable with the findings of previous research. Banks (2014) mentioned that if the learning environment is favorable and comfortable, students' attention increases in the learning process. In addition, they stated that the classroom environment influences student academic activities. Fraser and Fisher (1982) mentioned that if the classroom environment is conducive, comfortable, and fun, it plays an important role in the learning process. In addition, students' tastes as well as moods, affect the functioning of their brains.

Conclusion

The nature of classrooms affects children's learning and appears to be a weak link. However, it can be found that the classroom environment such as temperature, ventilation, lighting, and noise level in the classroom can increase children's willingness to learn by building a motivating and comfortable learning and teaching environment.

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