

The Impact Of Smart Classrooms On The Academic Success Of Sri Lankan Government School Students

Thivanka Mailewa, Piumika Chandrasiri, Dileepa Chandrasena, Sajeevkanth Kirubhakaran, Diluksan Jesudasan, Wasantha Rajapakshe, Akalanka Mailewa

Abstract: A smart classroom is regarded as one of the essential modes of teaching that can transform an old-fashioned educational system into a more cutting-edge method. Past articles and social opinion has identified that there is a doubt among the Sri Lankan general populace whether Smart classrooms are really useful for school students in this country. This study, therefore, has four objectives. They are to identify the determinants factors of a smart classroom, to evaluate the impact of a smart classroom on a school student's academic success, to determine the relationship between the variables of the study and to provide practical suggestions to the government to improve the digital educational system. The study used a mixed approach to analyze both primary data and secondary data. A survey questionnaire was created and distributed among the students. Past research articles were used as a secondary data collecting methods for the analysis. The sample size for the study was 200 students from four government schools. The purposive sampling method was used for data collection. 250 questionnaires were distributed among the students and 200 usable responses were gathered. The study analyzed the data using multiple regression and Pearson correlation. The analytical tool was SPSS. Through the analysis, the researchers found that all the objectives were achieved and the hypotheses were supported. The significance of this study is that it is able to provide suggestions and recommendations to the relevant authorities regarding the implementation of Smart classrooms in primary and secondary schools.

Keywords: Smart classroom, Comfortability, Availability, Adaptability, Personalization, Distance education, Remote learning

1. INTRODUCTION

Globalization has made significant changes to all sectors in the world related to human beings. Some sectors like education, transport, banking, and health and assurance are particularly affected by globalization. The internet which has aided globalization, is a worldwide network which can be used by all people who's having the accessibility [10]. Most recently, the internet has become a significant tool used by school students to improve their academic performances. Traditional educational systems like direct teaching, hard books, and library usage has decreased significantly as a result of the advent and development of the internet [18]. Internet provides the services to the students as its really cheap when comparing with referring the hard books [17]. The smart concept is defined as a set of well-defined devices and tools or objectives [15]. A smart classroom is a technology-based educational source that is spreading all over the world which allows students to learn with the help of computer Hardware's, software's, and other multimedia sources. Smart classrooms are defined as one of the easiest modes of resources that can be used to convert old-fashioned traditional educational systems into more modern ones with the help of new technology. Students has to have an interest about the education. Without this interest students cannot expect to achieve the desired results. Therefore, smart classrooms are a means of generating this interest as a path to academic success. The hardware's that are using in a smart classrooms are smart boards, tabs, laptops, projectors and multi-screens. The smart classroom are different from traditional classrooms in that they use the latest technology while traditional classrooms still employ old fashioned methods of teaching and learning. A smart classroom provides many more benefits than the traditional classroom, and these include technological skill improvement of the children and the ability to be connected to the rest of the world [19]. In addition, students are now more likely to study in a smart classroom than the traditional class as learning is more

exciting and interesting. This interest that is generated can spark an enhancement in students' Academic performance as well. The language which use with the smart classroom is English and it's an advantage to improve the language skills of the students as English is the secondary language in Sri Lanka. Unlike in a traditional classroom, students have to search independently for information in order to gain knowledge [8]. Rather than noting down every word that is uttered by the teacher. Therefore, smart classrooms have developed as a solution to improve the skills of future generations with the help of information communication technology. If a school has a smart classroom, the attendance of its students could also improve because most young people love to deal with technology rather than with traditional textbooks. This study aims to identify the impact of the smart classroom on the academic success of students in government schools in Sri Lanka. The study has four objectives. They are to identify the determinants of a smart classroom, to determine the impact of a smart classroom on a school student's academic success, to determine the relationships between the variables and to provide practical suggestions to the government to improve the digital educational system. This study also provides some recommendations for educational authorities on areas that need to be developed within this concept to improve its quality and efficiency, which in turn will impact the high school student's educational and social knowledge [16]. In the year of 2012 this new concept of the smart classroom came to the fore [18]. Here, it was found that optimizing the classroom environment will support technology-enhanced learning [18]. When comparing with the traditional schools it has been found that learning scores of smart classrooms are higher than that of traditional schools [15]. According to a research paper by [2], have identified, using the internet to improve academic success may sometimes be a hard task as technology can sometimes have adverse impacts on students. According to [12], high usage of internet can have an probability to addict

to the internet usage. It can be a problem when considered in the light of students' academic success. Some studies mention that female students most often use internet to chat and to send and receive email messages while male students focus mainly on extra-curricular activities rather than on academic work [2]. [7] has described smart classrooms and explained how an intelligent agent could integrate the gap between smart educational activities and traditional classrooms activities in terms of the teacher's experience. According to previous research [13], the Sri Lankan educational system is still based on desktop computing, and teachers are required to sit in front of a desktop computer using a keyboard and mouse. Such a situation makes teachers uncomfortable and reduces the efficiency of the course as the natural tendency of the teachers is to struggle with the desktop computer. By using a SMART board, teachers can feel comfortable since they are no longer tied up with a desktop computer. They have the opportunity to use cumbersome keyboard and mouse to interact with an inefficient educational system [6]. "Familiarizing with the computer and adopting that will help increase the academic performance of students regardless of their gender" [4]. The design and execution of a smart classroom should consider a comfortable arrangement fitted to end-users' wants and needs, should be equipped with various resources, be socially and digitally connective, should be clean and open to its actual environment and the world, and finally, be safe for whoever is using it and safe for its technological instruments [6], [13]. Upgraded classrooms should attract more students, have more communication choices and therefore be able to reach more learning styles. It would be possible to learn more about the necessary technologies comfortably and understand the lessons more easily than in traditional classrooms [11] "Impact of the smart classroom is there for increasing the academic performance of students" [9]. "Comfortability is a factor which concerns the facilities and the structure of the classroom and if there is a flexible structure in the classroom it would help enhance the academic targets of students" [14]. [5] have identified that smart classroom learning could decrease the gap in post-secondary access between students of different languages due to at-home internet connections, desktop computers, and other digital devices.

Research Questions

1. What are the determinant factors of smart classroom, which has implications for students' academic success?
2. What is impact of smart classroom on students' academic success?
3. What is the relationship between smart classroom determinate factors; comfort, availability, personalization and adaptability and academic success?
4. What are the practical suggestions can provide to government officers to improve the system?

Research Objectives

1. To identify the determinant factors of a smart classroom which are implicates for the students' academic success.

2. To determine the impact of smart class on school student academic success.
3. To determine the relationship between the comfort, availability, personalization and adaptability and the academic success of a student.
4. To provide practical suggestions to government officers to improve the system.

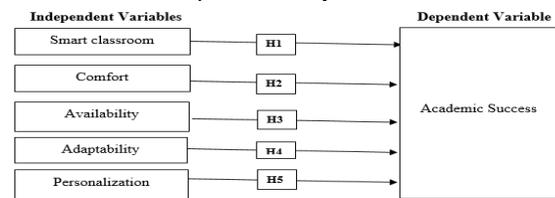


Figure 1: Conceptual Framework

Figure 1 shows the conceptual framework of the study. The study employs five independent variables and a single dependent variable. The independent variables are the smart classroom, comfortability, availability, adaptability, and personalization. The dependent variable is the academic success of students.

Hypotheses of the study

H1- There is a significant relationship between smart classroom teaching and academic success of school students.

H2- There is a significant relationship between comfortability and academic success of school students.

H3- There is a significant relationship between availability and academic success of school students.

H4- There is a significant relationship between personalization and academic success of school students.

H5- There is a significant relationship between adaptability and academic success of school students.

This section presents a basic introduction to the study. It includes the background of the study, the research problem and the gap, and the conceptual framework. The next section presents the methodology of the study. It includes the research design and shows how the authors collected the data and the instruments which have used to perform the analysis.

METHODOLOGY

Research Design

According to the research proposal, this study uses the deductive approach. That means that the theoretical background is first identified and the analysis of data for hypothesis testing is done in relation to the theoretical background. The study follows the quantitative data collecting method for primary data collection and uses a purposive sampling technique. To identify the impact of Comfort, Availability, Personalization, and Adaptability, a survey questionnaire based on extant research was created to measure the variables with three scales and close ended questions.

Sampling Design

There are two types of schools in Sri Lanka, namely, government schools and private schools. The number of government schools in the island is 9790 [13]. The sampling technique used is the purposive sampling technique. Of the government schools, there are only 13

schools having smart classrooms according to the information provided by the Ministry of Education. Of these 13 schools, the researcher selected four schools for the study. They are Sri Jayewardanepura Maha Vidyalaya, Kotte, Mahinda Rajapakshe College, Homagama, Sylvester College, Kandy, and Ganethanna Vidyalaya, Mawanella. This study aimed to collect two hundred (200) student responses from the four schools that have smart classrooms [2].

Method of Data Collection

This study uses a quantitative data collecting method to collect primary data. The survey questionnaire has been created by referring to past research articles in areas related to the variables of the study. The scales employed by the study are developed from past research studies as Cronbach's alpha reliability is always between 0.7 and 0.9 in those studies [18]. The questions to measure the availability variable were taken from the work of [18] where Cronbach's alpha was almost above 0.7. Another variable of this study is adaptability. A research study done by [3] resulted in a Cronbach's alpha value of 0.89 for adaptability.

Research Methodology

This section deals with how the survey questionnaire was created and why the analyses have been done as they have. This study uses a mixed approach to data collection. To gather quantitative data, primary data was collected from the students while past research articles, journals, and websites have been used as the secondary data collection method for purposes of analysis. The conceptual framework was created with the help of extant research to test the hypotheses using the variables. Thereafter, Pearson correlation and multiple regression analysis were done to determine the impacts of the independent variables on the dependent variable [2].

Responses from the Students

Before soliciting students' responses, the authors obtained permission from the Ministry of Education, Sri Lanka to visit schools. Since most school students are capable of understanding and answering the types of questions included in the questionnaire, they completed the questionnaire successfully. The few responses that were incorrectly filled were removed from the analysis. Altogether, 250 questionnaires were distributed and 200 correct responses were obtained for analysis. All students responded voluntarily and were happy to take part in the survey. The principals and staff of the schools also provided ample support to get the job done.

Sampling Technique

There are about 9790 government schools in Sri Lanka, in which about 41, 18,781 students study. However, amongst these, only 13 schools use the smart classroom facility. Therefore, a sufficient number of students (200) were selected for the study from 4 schools out of the 13.

Research Instruments

This study is performed on school students. Therefore, an online survey or other similar method for data collection

was not feasible. It was necessary to visit the schools and physically gather the responses through the distribution of the questionnaire [2]. The questionnaire was created to measure the variables. There is one question that solicits the average of the total marks obtained for the final term test of the student. According to this study, the results related to this question will affect the conclusion about academic success.

Data Gathering

To complete the objectives of this study, the researchers needed to collect data from the school students. To gather the information, the questionnaire was distributed directly to the students by visiting each school. After distributing the questionnaire, the data was gathered within two weeks since the questionnaire had to be physically distributed. Before distributing the questionnaires, the research team filled them to check the reliability and validity of the questionnaire. The study conducted by [3] has identified that undergraduates of the university were using the internet every day.

Statistical Treatment of Data

The creation of the questionnaire, selection of the sampling method data gathering, and analysis were done based on previous research. The average term test mark was used as the measurement for hypothesis testing. The questionnaire was distributed amongst 13 495 students and 12 514 usable responses were collected. The gathered information was analyzed through SPSS version 23.0 [18]. Thus far, this paper has presented the basic overview of the study undertaken to identify and solve some real problems inherent in smart classrooms in Sri Lanka. The following section presents in detail the data analysis and the generation of results using SPSS, which were then used to obtain insights into the study problems.

RESULTS AND DISCUSSION

Table 1: Pilot survey analysis

Determinant Factor	Cronbach's Alpha Value
Smart classroom	0.702
Comfortability	0.71
Availability	0.759
Adaptability	0.742
Personalization	0.751

Table 1 of the pilot survey analysis illustrates how the authors have used 20 responses to test the reliability of the questionnaire. The total numbers of questions are 33 from 5 different parameters. The reliability value of the total sectors is 0.732. Therefore, this survey questionnaire can be termed as a highly reliable questionnaire. The variable Adaptability has a 0.726 reliability. It includes 6 items. This

is also a highly reliable parameter. The variable Availability, which includes 7 questions, scored 0.711. Comfortability, measured by 8 specific questions, has a Cronbach's alpha value of 0.710. The variable Personalization, measured by 6 questions, has a Cronbach's alpha value of 0.706. The final independent variable of this study, which is the Smart classroom, has a Cronbach's alpha value of 0.715. Overall,

Table 2: Descriptive Analysis

	Minimum statistic	Maximum statistic	Mean statistic	Std. Deviation statistic
Gender	1	2	1.79	.412
Grade	2	7	4.70	1.603

Table 2 in the descriptive analysis is related to the descriptive statistics obtained from analyzing the demographic factors related to the respondents who provided answers to the questionnaires. The highest frequency in the gender variable is for males. Therefore, it can be identified that the percentage of male respondents who provide responses are higher than the percentage of female respondents. And when considering the grade that

this questionnaire can be identified as a highly reliable questionnaire for school students according to this pilot survey test. In the extant literature, according to [10], Cronbach's alpha value was 0.914 for Availability. This is a very high value where reliability analysis is concerned.

the particular respondent is currently studying in, it was found that at present, the highest percentage of respondents are currently studying in Grade 12 and the lowest percentage of respondents are studying in Grade 7. Another point to note is that the majority of students are satisfied with the level of equipment provided to them. Also, the percentage of students who have very low satisfaction levels related to the equipment provided is the lowest among all the percentages

Correlation Analysis

Correlation is simply the mutual relationship between two variables. The following tables show the mutual relationship between the two tables corresponding to the questions used to collect data.

Table 3: Correlation of availability

	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7
Question 1 Pearson sig.	1						
Question 2 Pearson sig.	.269** .000	1					
Question 3 Pearson sig.	.202** .004	.257** .000	1				
Question 4 Pearson sig.	.071 .318	.032 .653	.361** .000	1			
Question 5 Pearson sig.	.324 .000	.330** .000	.283 .000	.304 .000	1		
Question 6 Pearson sig.	.308** .000	.294** .000	.079 .264	.212* .003	.518* .000	1	
Question 7 Pearson sig.	.264** .000	.186** .000	.269** .000	.381** .000	.270** .000	.265** .000	1

According to Table 3, which depicts the correlation of availability with academic performance, the correlation is measured by evaluating the correlation values between the questions related to the factor Availability and Academic performance. Each question records a correlation value

between 0.3 and 0.7, and the average correlation value is 0.37. As the average value is between 0.3 and 0.7 it can be identified that there is a moderate, positive, linear relationship between Availability and Academic performance.

Table 4: Correlation of comfortability

	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
Question1 Pearson sig.	1							
Question2 Pearson sig.	.348* .000	1						
Question3 Pearson sig.	.201* .004	.130 .066	1					
Question4 Pearson sig.	.250** .000	.291** .000	.095 .179	1				
Question5 Pearson sig.	.249** .000	.025 .725	.173* .014	.318** .000	1			
Question6 Pearson sig.	.227** .001	.170* .016	.323** .000	.254** .000	.368** .000	1		
Question7 Pearson sig.	.134 .059	.128 .071	.331** .000	.122 .085	.412** .000	.491** .000	1	
Question8 Pearson sig.	.169* .017	.227** .001	.031 .662	.572** .000	.303** .000	.237** .001	.316 .000	1

Table 4 is the correlation between the questions related to Comfortability and Academic performance. It records an average of 0.37 correlation between those two factors. This

result highlights the fact that there is a moderate, positive, linear relationship between Comfortability and Academic performance.

Table 5: correlation of adaptability

	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6
Question 1 Pearson sig.	1					
Question 2 Pearson sig.	.426** .000	1				
Question 3 Pearson sig.	.386** .000	.436** .000	1			
Question 4 Pearson sig.	.360** .000	.333** .000	.346** .000	1		
Question 5 Pearson sig.	.204** .004	.433** .000	.387** .000	.285** .000	1	
Question 6 Pearson sig.	.144* .041	.122 .085	.155* .028	.173* .015	.082 .247	1

According to Table 5, which depicts the correlation of Adaptability with Academic performance, the Pearson correlation value between Adaptability and Academic

performance is 0.34. This indicates that there is a moderate, positive, linear relationship between Adaptability and Academic performance.

Table 6: correlation of personalization

	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6
Question 1 Pearson sig.	1					
Question 2 Pearson sig.	.494** .000	1				
Question 3 Pearson sig.	.415** .000	.356** .000	1			
Question 4 Pearson sig.	.313** .000	.327** .000	.425** .000	1		
Question 5 Pearson sig.	.242** .001	.145* .040	.188** .008	.404** .000	1	
Question 6 Pearson sig.	.428** .000	.305** .000	.182** .010	.378** .000	.260** .000	1

According to Table 6, which depicts the correlation of Personalization and Academic performance, the correlation between Personalization and Academic performance is 0.39. That value is also higher than 0.3 and lower than 0.7

and it can be concluded that there is a moderate, positive, linear relationship between Personalization and Academic performance.

Table 7: correlation of smart classroom

	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6
Question 1 Pearson sig.	1					
Question 2 Pearson sig.	.511** .000	1				
Question 3 Pearson sig.	.260** .000	.282** .000	1			
Question 4 Pearson sig.	.310** .000	.281** .000	.498** .000	1		
Question 5 Pearson sig.	.268** .000	.239** .000	.395** .000	.371** .000	1	
Question 6 Pearson sig.	.350** .000	.371** .000	.296** .000	.354** .000	.310** .000	1

Table 7 depicts the correlation between the Smart classroom and students' Academic performance. The average correlation value is 0.43 and it shows that there is a moderate, positive, linear relationship between the Smart classroom and Academic performance.

Through all the results obtained thus far, it has been identified that Academic performance has a moderate, positive, linear relationship with all the determinant factors of the smart classroom. This conclusion can be arrived at because all the correlation values are clearly between 0.3 and 0.7.

Regression Analysis: Model Summaries

Table 8: Availability Table

R	R Square	Adjusted R Square	Std. Error of the Estimate
.124a	.015	-.020	.753

Table 8 explains the R Squared value which shows that 1.5% changes in Academic performance can be predicted by the Availability Factor. This is a significant difference compared to the previous result.

Table 9: Comfortability Table

R	R Square	Adjusted R Square	Std. Error of the Estimate
.209a	.044	.004	.744

Table 9 explains the Regression values related to Comfortability and Academic performance. It indicates that 4.4% of the variance in Academic performance can be forecasted by the Comfortability factor.

Table 10: Adaptability Table

R	R Square	Adjusted R Square	Std. Error of the Estimate
.269a	.073	.044	.729

Table 10 shows that 7.3% of the variance in Academic performance can be predicted by Adaptability which is one of the determinant factors of the Smart classroom.

Table 11: Personalization Table

R	R Square	Adjusted R Square	Std. Error of the Estimate
.249a	.062	.033	.733

Table 11 shows the R squared values for the relationship between Personalization and Academic performance. It is noteworthy that 6.2% of the variance in Academic performance can be predicted by Personalization.

Table 12: Smart Classroom Table

R	R Square	Adjusted R Square	Std. Error of the Estimate
.209a	.044	.004	.744

As shown in Table 12, 5.5%. Of the variance in Academic performance can be predicted by the Smart classroom factor. As per the details gathered, it can be identified that there is an overall influence of the Smart classroom on academic performance as each determinant factor affects academic performance to a certain extent.

Table 13: Regression of Availability

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	3.219	.206		15.646	.000
	I am satisfied with the level of equipment's that provide for the smart class room	-.025	.066	-.030	-.371	.711
	There are enough data base for learning (google open)	.011	.058	.015	.187	.852
	I can easily connected to the internet	-.063	.053	-.098	-1.185	.238
	I can share digital resources with peers	-.012	.054	-.020	-.230	.818
	I can get the videos that the teachers use in class	.009	.059	.014	.150	.881
	I can get digital learning resources	-.027	.072	-.033	-.371	.711
	I can find that computer sockets in classroom when I need to use	.066	.051	.106	1.295	.197

Dependent Variable: For year 2019 average marks for year

According to the b value depicted in Table 13, 3.219% of Academic performance can be described by the Availability factor. Since the significance value is 0.000 and lower than

0.005, a conclusion can be drawn that there is a significant relationship between Availability and Academic success.

Table 14: Regression of Comfortability

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	3.197	.194		16.483	.000
	I can learn lessons easily	-.082	.067	-.098	-1.232	.220
	I can feel the difference between the smart classrooms and the traditional class rooms	-.011	.084	-.010	-.131	.896
	Temperature in the class room is affected for the concentration	-.052	.043	-.095	-1.194	.234
	There are well designed classrooms	-.127	.095	-.126	-1.336	.183

	I don't feel sleepy in the classroom because of fresh air	.088	.056	.134	1.576	.117
	No unnecessary noises exit in classroom	.025	.061	.035	.403	.688
	I can get the related videos that the teachers going to teach before the class	-.014	.049	-.027	-.296	.768
	I think the components that the used in the smart classroom are sufficient for the studies	.117	.075	.142	1.563	.120
Dependent Variable: For year 2019 average marks for year						

According to the b value of 3.197 depicted in Table 14, 3.197% of Academic performance can be described by the Comfortability factor. The significance value is also less

than 0.005. Therefore it could be concluded that there is a significant relationship between Comfortability and Academic success.

Table 15: Regression of Adaptability

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.985	.189		15.832	.000
	Improves the students group activities after adopt to smart classrooms	-.158	.065	-.198	-2.438	.016
	Smart classroom helps school students more likely to be engaged in their learning than the traditional classroom	-.097	.091	-.091	-1.062	.290
	Smart classroom has got linked with students and teachers	.088	.064	.114	1.370	.172
	Smart classroom has created a positive mindset to the students	.204	.075	.213	2.721	.007
	I feel very easy to learn in the smart class room with my friends without much effort	-.019	.074	-.021	-.259	.796
	Smart classroom can increase the student's attendance	.057	.069	.058	.816	.416
Dependent Variable: For year 2019 average marks for year						

According to the b value depicted in Table 15, 2.985% of Academic performance can be described by the Adaptability factor. Since the significance is less than 0.005

it can be concluded that there is a significant relationship between Adaptability and Academic success.

Table 16: Regression of Personalization

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.569	.184		19.391	.000
	I understand teaching with the multiscreen display properly	-.049	.095	-.046	-.515	.607
	Smart classroom helps to improve my reading competence	.056	.066	.071	.855	.393
	Smart classroom increase my computer skills	-.012	.090	-.011	-.130	.897
	Smart classroom helps me to plan school work in an efficient way	-.282	.101	-.242	-2.789	.006
	Smart classroom gives me access to search relevant websites and articles that are related to the academics	-.020	.045	-.033	-.433	.666
	Smart classroom helps me to contribute more in group activities	.034	.072	.039	.476	.634
Dependent Variable: For year 2019 average marks for year						

According to Table 16, the b value of personalization shows that 3.589% of Academic performance can be described by Personalization and as the significance value is 0.000

(which is less than 0.005), it has been identified that there is a significant relationship between Personalization and Academic success.

Table 17: Regression of Smart Classroom

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1	(Constant)	3.216	.175		18.359	.000
	level of Satisfaction equipments that provide for the smart classroom	.057	.074	.065	.773	.440
	Knowledge of working with the smart devices	-.051	.064	-.067	-.794	.428
	Necessity of smart classroom	-.074	.086	-.072	-.857	.393
	level for Interest about smart class concept	.220	.082	.213	2.671	.008
	Benefits of the smart class room	-.060	.092	-.055	-.648	.518
	Knowledge with internet usage	-.107	.061	-.142	-1.766	.079
Dependent Variable: For year 2019 average marks for year						

In Table 17, the b value indicates that 3.216% of Academic performance can be described by the Smart classroom. Since the significance value of the smart classroom factor is 0.000 (which is less than 0.005), it can be seen that there is a significant relationship between the Smart classroom and Academic success.

CONCLUSION

The previous section has analyzed the data gathered from the responses. Through the descriptive analysis, some important aspects related to the demographic factors of the respondents were highlighted. In particular, the highest and lowest frequencies were recorded in this descriptive analysis. The correlation analysis shows that there is a moderate positive correlation between all determinant factors and academic success. All the correlation values of the above determinant factors related to the smart class were between 0.3 and 0.7. Through the model summary of regression analysis, the R squared values show the proportion of the variance in the dependent variable that can be predicted by the determinant factors of the independent variable. The R squared values reveal that all the above determinant factors can be used to predict the variance in academic success, albeit, to a certain extent. The analysis of the significant values reveals that the above determinant factors have significance values less than 0.005. This means that all the factors related to the smart classroom have a significant relationship with academic success. Thus, all the hypotheses advanced by the research can be accepted. Next, the paper discusses the current research results in relation to findings in the extant literature. For the growth and improvement of the concept of the smart classroom, the authorities need to focus on the factors that are important for the development of the entire country; therefore, the government's focus should be on the methods and manners of instruction that are used in smart classrooms. To this end, investments have to be made by targeting the purchase of appropriate technological equipment that is helpful in academic learning, and the teachers and students who are more familiar with traditional learning method have to be trained to use technology-oriented learning methods.

This section of the paper presents in detail the results of Correlation Analysis and Regression Analysis, both of which were generated by SPSS. It includes all the tables that were used to analyze the data. The following section comprises the conclusion and recommendations.

Another important factor that is supportive of students' academic development is the level of comfortability existing in the classroom. If these moves can be made, it will help to the establishment of smart classrooms to enhance academic value ensuing to students, consideration has to be given to the comfortability of classrooms. Another important recommendation is given in the literature review is to find out an "Android-based smart learning and attendance management System" with its emphasis on the importance of attendance checking and several other functions related to education with the help of technology. If such systems can be established within the schools it would help raise students' academic levels as they would feel more comfortable with such technology-based systems; these systems would also save time when they are used instead of manual systems for such functions [9] Therefore, the above-mentioned changes can be introduced which would help raise academic standards. Classrooms can be arranged with the required facilities such as suitable lights, less noise, comfortable chairs, and computers with less technological problems. Several other sub-factors like air condition rooms would be helpful to achieve the target of enhanced academic success since under such conditions like, students would be motivated to engage in their studies efficiently when compared to their efforts in traditional classrooms. The availability of the required factors within the classroom is another aspect to be considered when attempting to promote academic success in smart classrooms. To this end, the classroom should include the required factors that support learning – especially those factors related to the classroom environment, the instructor and the courses followed by students. "Optimizing the classroom environment to support technology-enhanced learning" is a research study done by Yang and Huang that indicates the importance of facilitating classrooms with the required factors that are needed for learning. They mention

that " observation of classrooms and getting details related to the things that have to be implemented within the classrooms and concentrating on filling those gaps and providing things that have to be available within the classrooms to students would help get the appropriate academic-oriented results from those students" [18]. The study by [11] further highlights the importance of understanding the level of the student's satisfaction with the classroom infrastructure and with the instructor's knowledge of the smart learning process and whether the relevant course or subject could be taught using the smart learning methods in the most appropriate manner. It is also important to identify the factors necessary for the most appropriate learning environment within the institute and to identify whether the university or the school has appropriate facilities to move into a smart classroom-oriented learning procedure [11]. The above recommendations can also be made to increase the academic level of students in Sri Lanka. It is better to directly observe the teaching-learning process or distribute questionnaires among students and solicit their opinions about the facilities available in smart classrooms and to identify the areas that have to be developed. In addition, the level of technological knowledge of the instructors related to the smart educational process should be correctly identified [1]. Another important factor is that the course that the students are following should be correctly identified. According to the different needs of the students in the course, priority should be given to the provision of appropriate facilities. For example, if the course is related to IT, since it is relatively easy to conduct such a course in a smart classroom, the facilities for conducting the course should be prioritized. To accomplish the above mentioned process, a team should be assembled to collect the relevant data about the educational institute as the initial stage. Identification of what is important within the smart classrooms and an awareness of the advantages that can be achieved by moving to smart classrooms is crucial. It is important to build awareness among students and teachers that learning within the smart classroom is not a difficult task and that it could be done successfully by anyone. To do that, a specific team with the required motivational skills and knowledge should be established to provide students with the proper knowledge about the process of moving to a smart classroom-oriented learning environment. Adaptation to the environment in a Smart classroom should be considered as an important factor since the majority of Sri Lankan schools and high schools are still using traditional methods of teaching and learning.

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REFERENCES

- (1) ALLEN, D. (1997) The hunger factor in student retention: An analysis of motivation. To The Educational Resources Information Center (ERIC), 9-92
- (2) BOLUSTEVE, F. N., OYEYEMI, O. P. and AMALI, I. O. O. (2015) Internet Usage and Academic Performance of Undergraduate Students in University of Ilorin, Nigeria. *Internet Usage and Ethiop. J. Educ. & Sc.*, 11 (1), 39-47
- (3) COLLIE, R. J., MARTIN, A. J., PAPWORTH, B. and GINNS, P. (2016) Students' interpersonal relationships, personal best (PB) goals, and academic engagement. *Learning and Individual Differences*, 45 65-76
- (4) DOMINGO, M. and MARQUÈS, P. (2011) Classroom 2.0 Experiences and Building on the Use of ICT in Teaching. *Scientific Journal of Media Literacy*, 169-174
- (5) GLADIEUX, L. E. and SWAIL, W. S. (1999) The virtual university & educational opportunity. issues of equity and access for the next generation. *policy perspectives. Policy Perspectives*, 1-36
- (6) GUILLERMO, B. and BORGES, F. (2013) Smart Classrooms: Innovation in formal learning spaces to transform learning experiences. *Bulletin of the Technical Committee on Learning Technology* 1-3
- (7) GUNN, C. (2003) Dominant or different? Gender issues in computer supported learning. *Jaln*, 7 (1), 14-30
- (8) GUPTA, M. and SINGH, K. (2017) Effect of Smart Classroom Teaching On Achievement of Students: A Closer Focus on Gender and Intelligence. *Imperial Journal of Interdisciplinary Research (IJIR)*, 3 (1), 1077-1086
- (9) JOSHI, F. V. (2017) The effect of smart class on academic achievement. *International Journal on Recent and Innovation Trends in Computing and Communication*, 5 (7), 416 – 419
- (10) MARTIN, A. J., NEJAD, H. G., COLMAR, S. and LIEM, G. A. D. (2013) Adaptability: How students' responses to uncertainty and novelty predict their academic and non-academic outcomes. *Journal of Educational Psychology*, 105 (3), 728-746
- (11) MARY, C. H. and KATHRYN, K. E. (2010) The Impact of Physical Classroom Environment on Student Satisfaction and Student Evaluation of Teaching in the University Environment *Academy of Educational Leadership Journal*, 14 (4), 65-79
- (12) MORAHAN-MARTIN, J. (2005) Internet abuse addiction? disorder? symptom? alternative explanations? *Social Science Computer Review*, 23 (1), 39-48
- (13) NISHANTHA, G. G. D., PISHVA, D. and YUKUO, H. (2008) Smart classrooms: Architectural requirements and deployment issues. *IEEE Region 10 Colloquium and the Third ICIS, Kharagpur*, 1-6
- (14) SCHAFFER, J. and JO, B. (2017) Improving preschoolers' mathematics achievement with tablets: a randomized controlled trial. *Preschoolers' mathematics achievement with tablets*, 1 (1),
- (15) TALEBA, Z. and HASSANZADEHB, F. (2014) Toward smart school: a comparison between smart school and traditional school for mathematics learning. *Procedia - Social and Behavioral Sciences*, 171 (1), 90 – 95
- (16) THIYAGARAJAN, V., TAMIZHARASAN, T., SENTHILKUMAR, N. and KARTHIKEYAN, B. (2018) Enhancing human comfort and improving illuminance level in smart class room through optimization approach. *Journal of Advanced Engineering Research*, 5 (1), 20-30
- (17) WATTERS, C. A., KEEFER, K. V., KLOOSTERMAN, P. H., SUMMERFELDT, L. J. and PARKER, J. D. A.

- (2013) Examining the Structure of the Internet Addiction Test in Adolescents: A Bifactor Approach. *Computers in Human Behavior*, 29 (6), 2294-2302
- (18) YANG, U., PAN, H., ZHOU, W. and HUANG, R. (2018) Evaluation of Smart Classroom From the Perspective of Infusing Technology into Pedagogy. *Smart Learning Environments*, 5 (20), 2-11
- (19) YUE, S., NAOKI, M., TORU, I. and YUANCHUN, S. (2008) Open smart classroom: extensible and scalable smart space using web service technology. *Department of Computer Science and Technology*, (3), 428-439