

The Effect of the Adequacy of School Facilities on Students' Performance and Achievement in Technology and Livelihood Education

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Abstract

A considerable number of variables that operate in the teaching-learning process invariably affect the educational performance and achievement of students. One crucial variable that directly impacts the quality of learning acquisition among learners is the adequacy or lack of school facilities that aid in the reinforcement of knowledge and skills. The purpose of this study was to establish a relationship between the quality of school facilities and student performance and achievement, in relation to the field of Technology and Livelihood Education (TLE). Mixed methods design was used in this study where questionnaires were administered to and interviews were carried out with the respondents who were department heads and selected instructors in the field. In addition, data was also collected from the school anecdotal records. Independent z-test was conducted to specifically identify the difference in students' performance and achievement prior to and after the procurement and utilization of new facilities in the TLE department. Results revealed that the component with the highest mean rating was the exterior environment (3.50) and the component with the lowest mean rating was support space (2.97). In terms of student performance and achievement, the largest increase was observed during school year 2010-2011 (22.0%) while the smallest increase was noted during school year 2009-2010 (2.8%). These findings support the assumptions that insufficient school facilities were negatively impacting student performance and achievement, and the administrators concerned take no significant action in addressing this educational issue. Since the lack of educational facilities was proven to pose serious ramifications on student performance and achievement, stakeholders should closely look into procedures that focus on facility support and management in the field of TLE.

Keywords: Technology and Livelihood Education, School Facilities and Equipment, Student Performance and Achievement, School Administrators, Facility Management, and Learning Environment

Introduction

Education for All (EFA)—an enactment that holds educational institutions accountable in providing quality education and maintaining high academic achievements for all students

in the country—appears to be almost unfeasible for many schools, which is highly challenged to meet EFA's requirements. Two of the essential factors to consider in order to fully attain the provisions in this enactment are (1) a curriculum that ensures student proficiency in taking standardized tests; and (2) the adequate number of teachers who can effectively translate the curriculum into meaningful instructional practices. Nevertheless, a third, and perhaps often overlooked factor that influence knowledge and skills acquisition of learners is physical school facility. Hughes (2005); Lyons (2001) opined that student performance and achievement depended upon the age, design, and condition of the school facility.

Learning, according to Lyons (2001), is a complex process that situates students' motivation and school's physical conditions into constant evaluation. These internal and external resources interrelate to achieve holistic learning within a learner. Educators should perceive each variable important in maintaining an uninterrupted flow of the process—there was no one variable that operated in isolation (Lyons, 2001). School facility must be equally viewed as an active contributor in this process. Thus, stakeholders must be aware of the different ways by which the conditions of the school facilities make or break the education of the students.

Based on research findings of the Department of Education (1999), public schools struggle when it comes to the availability of appropriate, useful, and quality school facilities on teaching and learning. Moreover, in 2002, Schneider heavily underscored that a large proportion of school facilities in the Philippines are approximately fifty years old and are typically in poor conditions. This finding was backed up by Filardo (2008) when he noted that public schools are constantly confronted with out-of-date designs, deteriorating conditions, and changing utilization pressures. The problem then is clearly visible—deficiencies in the physical school facilities result to serious ramifications in student learning and achievement, impairment of teaching standards, and persistence of health and safety problems for members of the faculty, as well as the students. Aggravating these issues is the inability of the authorities concerned to generate actions that purport to support the procurement of modern and relevant facility, likewise to train personnel in the management of these resources.

Poor condition of school facilities brings about critical concerns on teachers' and students' general welfare. Consequently, it becomes imperative that the functions school facilities fulfill in the student acquisition and learning of life-long knowledge and skill competencies should be taken into account by policy makers and administrators when designing a curriculum that provides equitable and efficient education. Stakeholders should realize that there exists an obvious, direct relationship between student performance and achievement and the quality of school facilities.

This study seeks to determine the relationship between the quality of school facilities and student performance and achievement; specifically, the researcher indicated the component of physical school facility that yields the heaviest weight in affecting student performance and achievement. The findings in this study provided implications for policy revisions and considerations in curriculum planning that can effectively address the aforesaid educational gaps resulting from the deficiency of physical facilities, which incrementally corrodes the quality of teaching and learning. Furthermore, the findings emphasized to focus attention on improving educational environment by increasing the procurement of equipment in the implementation of TLE curriculum, likewise in the maintenance, renovation, and expansion of school infrastructures to accommodate the growing number of Filipino youth enrolling in secondary schools. These installation and improvement measures are

hoped to provide avenues for students to proficiently translate theory into practice and to aim for life-long, meaningful learning.

These questions guided this research study: 1) what is the demographic profile of the respondents; 2) what extent does the quality and adequacy of educational facilities influence the learning environment, student performance and achievement in terms of: academic learning space; community/parent space; environment for education exterior environment; interior environment; specialize learning space; support space; and visual reinforcement; 3) what extent does the quality and educational adequacy of educational facilities have on the student performance and achievement; and 4) what are the possible relationship between leaning milieu to student performance and achievement?

Methodology

Research Design. The purpose of this mixed methods study was to examine the influence of the quality of facilities on the educational environment of a laboratory schools. It also would like to determine the relationship between school facilities and the school-learning environment. The program heads/department heads, or designees were the most qualified to evaluate the physical plant of the school as regards to its possible impact upon student performance and achievement.

Population and Sampling Procedures. The setting of this research study was at the state university involving different colleges and units. The participants were the college/unit department heads, or designees and concerned instructors. They evaluated the physical plant of the school with regards to how the school facilities impact student performance and achievement.

Instruments. The following were used in the study: (1) *Informed Consent Letter.* Administrators and teachers were given an informed consent letter asking them to participate in the research study. The questionnaires were strictly confidential, and names were not used when the research study was reported or published; (2) *Demographic Questionnaire.* A demographic questionnaire was developed and administered to the respondents. The demographic questionnaire included: age of the teacher, gender, highest level of education completed, number of years at the current school, and years of teaching experience. The collection of this type information provided greater opportunity to disaggregate the information; (3) *Learning Environment Assessment (LEA).* LEA questionnaire was used to access the quality and educational effectiveness of the school facility. This is developed to provide an instrument for school personnel to use that would systematically assess the quality and educational effectiveness of school facilities. The first section of the LEA utilized questions that pertained to the age of the facility, recent renovations, involvement of school instructional personnel in the planning process in the design of the building, the degree in which the instructional philosophy was integrated into the learning environment, and the use of portable buildings (*if any*) for classroom space. The second section of the LEA dealt with Educational Adequacy. This section also contained sub sections, academic learning space, specialized learning space, and support space, community/parent space, visual reinforcement, environment for education. It used a four-point Likert scale ranging from 1-4, indicating a response of *strongly disagree*, *disagree*, *agree*, and *strongly agree*. It was submitted to an experienced practitioner to review the questionnaire and to ensure that the items were unambiguous and would reduce the necessary information for the research study. Two sources of primary data were used in the study. The sources were questionnaires and interviews. The data was collected personally by the researcher and is considered to be a

primary data; and (4) *Interview Questions*. Interviews were used in this study. The researcher interviewed the respondents based on their availability. The researcher used open-ended questions in the interviews. Interviews allowed the researcher to gather historical information that cannot be seen. Respondents had the opportunity to give their opinions or comments on the possible relationship between building design/condition, student achievement.

Data Collection and Procedures. The LEA, the demographic questionnaire, and the interview questions were submitted to face validation and for approval. After the approval of the researcher's committee, the LEA, demographic questionnaires, and interview questions were sent to collect research data from human subjects. After the approval, the researcher met with the respondents of the school, department heads/program heads of the school to provide a brief overview of the proposed study, the Informed Consent letter, explained any anticipated risks, and provide copies of the questionnaires that were administered at the school to collect data. The letter provided and explained the purpose of the research study and the assurance of confidentiality. The questionnaire was distributed with the discretion of the researcher. A demographic questionnaire was developed and administered to the teachers. The collection of this type information provided greater opportunity to disaggregate the information. Interviews were used in this research study. The researcher interviewed the respondents. The researcher used open-ended questions in the interviews. Data necessary for a statistical comparison to the LEA scores were obtained from the school registrar report and the reports generated by the school. Student performance and achievement data were based on the National Achievement Test (NAT) scores of the students.

Data Analysis. This research was conducted as a mixed method study that used descriptive statistics to analyze the data. Analysis of results came from basic statistical methods that were described and outlined. The results from the questionnaire, LEA were entered into a Microsoft Excel spreadsheet. The Statistical Package for the Social Sciences (SPSS) for Windows® Version 18.0 were used to code, score, and analyze the data to produce numerical and graphical results for this research study. Descriptive statistical comparisons and analyses were used to show the relationship of variables in the study. Data collected in the interviews were consolidated into one single document and were used as personal testimony regarding the impact of school facilities on the learning environment. Using means and standard deviations, variables were measured on a continuous scale of measurement to summarize. The distribution for responses to each of the subsections of the LEA was measured. Multiple regression models were derived using combinations of the subsections of the LEA.

Results and Discussions

The discussions are arranged according to the major concerns of the study: (1) demographic description; (2) quality and adequacy of educational facilities as characterized by LEA; (3) quality and educational adequacy of educational facilities; and (4) possible relationship between leaning milieu (*school building design/condition*) to student performance and achievement.

Demographic Description

This section of the chapter provides a description of the research sample. Teachers were asked to respond to several demographic items including their gender, age, highest degree

earned, teaching experience, primary teaching position and number of years teaching at the current school. The results in Table 1 indicated that there were six male participants (37.5%) and 10 female participants (62.5%) who completed the instruments.

The educational attainment of the research sample of respondents is provided in Table 2. The results indicate that the vast majority of the respondents held a bachelor's degree (12.5%) at the time of the study and the remaining two (87.5%) held master's degrees.

Table 1

Gender Composition of Instructors and Professors

Gender	Frequency	Percent
Male	6	37.5%
Female	10	62.5%
Total	16	100.0%

Table 2

Educational Attainment of Instructors and Professors

Educational attainment	Frequency	Percent
Bachelor's degree	2	12.5%
Master's degree	14	87.5%
Total	16	100.0%

Table 3

Teaching Experience of Instructors and Professors

Teaching experience	Frequency	Percent
0-5 years	5	31.3%
6-12 years	5	31.3%
13-20 years	3	18.8%
21-25 years	2	12.5%
30 + years	1	6.3%
Total	16	100.0%

The teaching experience of the respondent participants is summarized in Table 3. The results indicate that the respondents were most likely to have between zero and five years or between 6 and 12 years of experience (31.3%). However, there were several respondents with more than 12 years of experience (37.5%).

This section of the chapter provides the data analysis results in order to address each research question. However, before each research question is addressed, the descriptive findings from the LEA are presented. The descriptive results from the LEA are presented first given that the LEA is relevant when addressing all of the research questions.

Quality and Adequacy of Educational Facilities

The second research question examined the extent to which the quality and educational adequacy of educational facilities have on the learning environment, student performance and achievement as characterized by the LEA. Sixteen administrators provided data relating to the LEA. The Likert-scale survey responses ranged from a low of one (*strongly disagree*) to a high of four (*strongly agree*). Higher values indicate more favorable perceptions. The

summarized results are provided in Table 5. The results indicate that the mean scores show levels of general agreement that the educational facilities are adequate. None of the minimum scores reflected general disagreement while the maximum scores tended to show relatively strong agreement and therefore favorable appraisals of the educational facilities. The results in Table 5 also indicate that the area with the highest (*most favorable*) mean rating was the exterior environment (3.50) and the area with the lowest (*least favorable*) mean rating was support space (2.97). Furthermore, the area in which administrators' perceptions were most similar was support space given that the standard deviation for that particular area was *smallest* (0.15). Overall, these survey results support the researcher's assumption that the new facility resulted in adequate to high quality educational facilities.

Table 5

Mean Total Learning Environment Assessment Scores

Sources		Minimum	Maximum	Mean	SD	Interpretation
Academic learning space		2.63	3.44	3.10	0.43	Agree
Community/parent space		3.00	3.83	3.33	0.44	Agree
Exterior environment		3.00	4.00	3.50	0.50	Agree
Interior environment		2.83	3.91	3.23	0.59	Agree
Specialized learning space		2.63	3.69	3.23	0.55	Agree
Support space		2.80	3.10	2.97	0.15	Agree
Visual reinforcement		2.75	3.50	3.00	0.43	Agree

LEGEND: *Rating Scale Descriptive Interpretation*

3.51 – 4.00	Strongly Agree
2.51 – 3.50	Agree
1.50 – 2.50	Disagree
0.00 – 1.49	Strongly disagree

In addition to the likert-scale survey items measuring the quality of the facilities, the administrators were also asked five questions about the facility. The first question asked about the age of the participants' facility. Administrators were also asked how long ago their facility was renovated as seen in Table 7.

Table 6

Age of Facility

Age of facility	Frequency	Percent
Under 10 years old	6	37.4%
10-19 years old	5	33.3%
20-29 years old	5	33.3%
30-39 years old	0	0.0%
40-49 years old	0	0.0%
50-59 years old	0	0.0%
60 years or older	0	0.0%
Total	16	100.0%

The next question asked administrators to indicate the extent to which the school instructional personnel were involved in the planning process with building designers at the time of the renovation (see Table 8). The summarized responses in Table 8 indicate that six of the sixteen administrators involved to some extent (37.5%) and ten indicated that school instructional personnel were involved to a great extent (62.5%).

Table 7

Years Last Renovation of the Facility

Most recent renovation	Frequency	Percent
Never renovated	0	0.0%
Less than 5 years ago	4	25.0%
5-9 years ago	4	25.0%
10-19 years ago	4	25.0%
20-29 years ago	4	25.0%
30 or more years ago	0	0.0%
Total	16	100.0%

Table 8

Extent of Involvement of School Instructional Personnel in Renovation

Personnel involvement	Frequency	Percent
Unknown	0	0.0%
Not at all	0	0.0%
Limited extent	0	0.0%
To some extent	6	37.5%
To a great extent	10	62.5%
Total	16	100.0%

Table 9

Degree Instructional Philosophy is Integrated into the Learning Environment

Instructional philosophy	Frequency	Percent
Unknown	0	0.0%
Not at all	0	0.0%
Limited extent	0	0.0%
To some extent	3	18.75%
To a great extent	13	81.25%
Total	3	100.0%

The next question asked administrators to indicate the degree to which the instructional philosophy of their campus is integrated into the learning environment (see Table 9). The summarized responses in Table 9 indicate that 13 of the sixteen administrators said to a great extent (81.25%) and three said to some extent (18.75%).

The last question asked administrators if portable buildings were utilized as classrooms on their campus. The summarized responses in Table 10 indicate the sixteen administrators said that no portable buildings were used as classrooms on campus (100.0%).

Table 10

Portable Buildings Utilized as Classrooms on Campus

Portable buildings	Frequency	Percent
Yes	0	0.0%
No	16	100.0%
Total	16	100.0%

Quality and Educational Adequacy of Educational Facilities

The third research question examined the extent to which the quality and educational adequacy of educational facilities have on student performance and achievement. The student performance outcomes by year are presented in Table 11. The results are provided for the baseline year (2009-2010) and the overall (*mean*) performance for the post period (2009- 2010 through 2012-2013). The results indicate that student performance was higher after the new facility in all four subjects and when considering all tests combined. The largest increase in student performance was seen in the year 2010-2011 (22.0%) and the smallest increase was seen in the year 2009-2010 (2.8%); however the year 2009-2010 performance was high prior to the new facility. These results also indicate that while only 75.25% of students passed the tests before the new facility, 84.55% of the students since the new facility passed the tests.

Table 11

Mean Student Performance by Year: Before and After New Facility

Period	2009-2010	2010-2011	2011-2012	2012-2013	All tests
Before	91.0%	53.0%	70.0%	87.0%	75.25%
After	93.8%	75.0%	76.8%	92.6%	84.55%
Growth	2.8%	22.0%	6.8%	5.6%	9.3%

In order to determine if the difference in student performance before vs. after the new facility was statistically significant, a z-test for proportions was conducted. The results in Table 12 indicate that the increase in the year 2009-2010 was not statistically significant, $z = -1.14$, $p = .254$; the increase in year 2010-2011 was statistically significant, $z = -5.17$, $p < .001$; the increase in year 2011-2012 was marginally significant, $z = -1.73$, $p = .084$; the increase in year 2012-2013 was statistically significant, $z = -2.21$, $p = .027$; and the increase in all year was statistically significant, $z = -3.91$, $p < .001$.

Table 12

Student Achievement Comparison z-Test Results

Year	Before	After	Z	P
2009-2010	91%	94%	-1.14	0.254
2010-2011	53%	75%	-5.17	< .001
2011-2012	70%	77%	-1.73	0.084
2012-2013	87%	93%	-2.21	0.027
All year	75.25%	84.55%	-3.91	< .001

Possible Relationship between Learning Milieu (*School Building Design/Condition*) to Student Performance and Achievement

In the open ended interview, teachers were asked to indicate what they liked about their building, what they didn't like and what they would not include if they were to design a building. The summarized teachers' responses were as follows: teachers need a larger area and more carpet; more windows; good layout; larger building; more computers; less noisy hallways; great wiring; smart board; extra doors in the room; same classroom layout for each core class; computer stations; printer; better software; smart board; computers for teacher-student computers; text books which have soft copies and are easy to use with smart boards; response per student equipment auto grading; wide halls; better arrangement, more storage for department; need better planning for technology advancements needed by the library; there was enough room for expansion; more emphasis on technology in the classroom and not just the library; too many corners for students to hide; buildings are too spread out; keep the heavy doors that keep out noise; no windows in the door; cameras that record 24 hours a day; a gym for athletic events only; an auditorium by itself (e.g., not in the cafeteria); less noisy halls; classrooms need windows; keep wide halls and good size of building; need individualized heating controls; don't have a gym attached to classroom hallways; all classes need windows, more teachers for restrooms in hall; all office staff in same area, circular hallways; thermostat should be easier to change; and more computers and rooms; larger area for art and home economics (laboratory) room.

Finally, teachers were asked to provide any comments regarding the possible relationship between building design/condition, student achievement, school climate, and teacher retention. The participants' responses were as follows: kept very clean and maintained; custodians do a great job; clean and cheerful; new building promotes pride and ownership; new schools promote pride in students and teachers; everyone likes new and shiny things; no one likes an old school; teachers and students alike are embarrassed; size and technology; the main concern is that windows provide red light which keeps students awake; there was a research done on channel 4, 5 or 8 and showed that the brain functions best; at a specific temperature we teachers have no control over temperature; technology is pushed a great deal in the school district; computers are not always available; art room; large classes but working and storage area is too small. The results for research question four gives evidence supporting the idea that changing the facilities creates a different learning environment. Creating change has a major impact on students, faculty, and administrators. This change creates the type of learning environment, which is more conducive to learning and performance. Survey data were collected from a total of 16 respondents based on the LEA. Student achievement rate was determined based on archival data. The results of the data analysis findings indicate that quality and educational adequacy of educational facilities are statistically significantly associated with student performance and teacher turnover rate showing a statistical change also. The findings of this research study had implications for setting policies and practices regarding the funding formula, planning, and design of school facility renovation or construction of new school buildings. The findings in this research study provided data on the relationship between school facility and learning environment and how growing school can effectively address or plan for students' learning needs with the appropriate facilities. The quality of school facilities was important to the discussion about school infrastructure.

Conclusion

It was revealed by the results that the educational facilities are adequate, as also shown by the general agreement in the mean scores. In addition, the minimum scores exhibited zero case of general disagreement, and the maximum scores presented relatively strong agreement. Consequently, the educational facilities were evaluated as favorable. These statistical findings further support the researcher's assumption that adequate to high quality of educational facilities resulted from the new facility, and that student performance increased after the new facility in all four school years—2009-2010, 2010-2011, 2011-2012, and 2012-2013. Nevertheless, in relation to students' performance and achievement, suggested that 65% of the students passed the test with the new facility, which is far from the initial passing rate of 48% prior to the new facility.

With these findings, the school leaders therefore must secure effective maintenance procedures of facilities. Stakeholders concerned must be involved in the production of sufficient funding allotted for the improvement of necessary facilities that lead to high levels of academic achievement. Finally, school officials and industry executives should organize a systematic approach of infrastructure appraisal and facility monitoring for regular actions of maintenance and repair.

Recommendations

Recommendations have been made for future practice in schools, and future research that will ultimately improve schools. Further, recommendations for applying current findings are presented. In order to improve student performance and improve the education process: 1) educators must have adequate facilities that provide an atmosphere and amenities for student success, educators must strive to improve student performance as well as to improve the education process; 2) should be provided for possible improvements in order to help school leaders to make the best decisions concerning facility improvements: school leaders must maintain facilities, making sure that preventative maintenance is completed; school leaders must ensure that buildings are kept clean and neat, which will help in the overall maintenance and aesthetics of the building; school leaders should work together with school board members, and the president to fund all necessary improvements to facilities to ensure the high levels of academic gain that is mandated by state officials; and officials, school leaders, and industry executives should develop a system for properly assessing buildings, and repairing those in the worst condition first; 3) there must be immediate spending on public schools maintenance and repair. This will help the economy and improve education quality and even health. Educators must be committed to closing the achievement gap, while at the same time having safe, up-to-date, quality facilities; 4) the government must continue to provide needed funding that supports school and local educational efforts and to help build and modernize school facilities. School facilities guidelines should be developed through collaborative process with educators and interested persons dealing with design, construction and maintenance of school facilities. These guidelines will link educational goals and facilities design, will help to facilitate flexible, performance-based application will help to encourage collaborative development; 5) similar study that explores the correlation between student achievement and a school organizational culture, and using different instrumentation such as surveys with teachers, students, parents, and other stakeholders could be conducted; and 6) school leaders must continue to beware of that they are the communicators in the school design and school facilities process. School leaders must work to hone their skills in order to represent their schools and community's needs, visions, and expectations. School

leaders and teachers must address school climate and school culture to assist in promoting better school safety from an internal as well as external approach.

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