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Facility Quality Relation to Learning Efficacy in Mafraq Governerate

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Abstract - Human resources development in the educational environment is becoming very critical to be able to provide quality and competitive graduates to the market. Education facility is the setting where interaction between students and teachers takes place. Facility quality affects students' performance. The study was conducted using interviews and surveys to elecit data from 229 administers located at three directorates of the North Badia region. Subjects were selected using stratified random sampling. Results indicated that overall perceived performance was associated with the following entities of facility quality: natural ventilation, classroom arrangement flexibility, attention to furniture and equipment. Further, the following entities of facility quality were positively correlated with directorates of the North Badia Regions: additional lighting sources, natural ventilation, presence of rest rooms, and school size; and were negatively correlated with indoor sports facility.

Keywords : *students' performance, facility, quality, physical, built, environment, higher education, impact, inputs, outputs, market, mafraq, jordan.*

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Facility Quality Relation to Learning Efficacy in Mafraq Governerate

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Abstract - Education facility is the setting where interaction between students and teachers takes place. Facility quality affects learning efficacy. The study was conducted using interviews and surveys to elecit data from 229 administers located at three directorates of Mafraq Governerate. Subjects were selected using stratified random sampling. Results indicated that learning efficacy was associated with the following entities of facility quality: natural ventilation, classroom arrangement flexibility, attention to furniture and equipment. Further, the following entities of facility quality were positively correlated with directorates of Mafraq Governerate: additional lighting sources, natural ventilation, presence of rest rooms, and school size; and were negatively correlated with indoor sports facility. Finally, the following entities of facility quality were positively correlated to village distance from Mafraq City: natural ventilation, existence of outdoor sports facility, food facility, rest rooms, and number of students in classroom. Administrators should keep in mind that although the education environment is complicated, the different aspects of services are inter-related, and they need to take a holistic view about the facility. Policy makers should realize the importance of facility's physical capacity in influencing students achievemnets.

Keywords : learning efficacy, facility, quality, physical, built, environment, education, impact, inputs, outputs, market, mafraq, jordan.

I. Introduction

There is evidence that situational (environmental) positions and attitude of students and teachers' towards school affect students' performance (Gump, 1987; Weinstein, 1985; Totusek & Staton-Spicer, 1982; Koneya, 1976; Brooks & Rebeta, 1991). Further, interactions between environmental factors and personal characteristics of students do exhibit significant effects on the academic performance of students (Lewin, 1943). No systematic attempts have been made to link the performance of schools to student results, to put in place effective monitoring mechanisms, or to make information about school performance available to parents and students (Galal, 2008). Educational environment is the setting where interaction between students and teachers takes place. Basic physical requirements of the school facility like minimum standards for classroom size, acoustics, lighting, heating and air conditioning, in addition to pedagogical, psychological and social variables act together as a whole in shaping the context within which learning takes place (Lackney, 1999).

Statistics of 2004 show lack of specialized teachers in various majors in Mafraq Governerate of Jordan. In addition, applied science majors are not established in schools at the dispersed human settlements from Mafraq City.

Mafraq Governorate area is about 26435 Square kilometers, which represents about 29.6% out of Jordan's total area, and the second largest governorate after Ma'an. Mafraq Governorate population reached 239,000 and represents about 4.6% of Jordan's total population of 2001, of which 47.6% are females and 52.4% of which are males; 42% are less than 15 years old compared to Jordan's rate, which is 39%; and 33.1% urbanite and 66.9% town residents. Population density is about 9-11 per one square kilometers compared to the rest of Jordan, which is 58 per square kilometer. The governorate has four regions that include (Department of Statistics, 2001): (1) Mafraq center with 104,000 with 3 districts and 72 settlements of which 25 increases over 1000 people; (2) Northwest Badia and its center is al Al Al-Bayt University and have three districts with 71,000 population and 42 settlements eight of which increases over 1000 people; (3) Northeast Badia have four districts with 51,000 population and 67 settlements with 10 settlements that have more than 1000 population; and (4) Ruwaished with population of 17,000 and twelve settlements, four of which is populated with more than 1000 (Department of Statistics, 2002).

Being the first of its kind, this study emphasizes the role of physical environment of educational facility in providing qualitative and competitive graduates, which impacts socio-economics of the local community. This research is significant by being a model that focuses on development of education facility within economic constraints to sustain resources independently from central governmental support. The researchers are expected to gain more expertise in the managment and development of physical educational facility. Goals of the study are to diagnosing the relevance of the physical facility to education output that will make Mafraq Governorate dependent on its own human resources. The study outcomes will provide a set of guidelines towards making educational facility (physically) more efficient.

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II. Literature Review and Theory

a) Teaching Environment Effect on Learning Efficacy

A study by Tam and Cheng (1995; 1994) conceptualized quality of school teaching environment based upon a multi-perspective approach. It measured the internal social environment of the school organization and its relations to the performance of teachers and students. School environment and performance of students had theoretical and practical implications. There were six integrated school environment factors that emerged to reflect the learning/-teaching environment: strength of leadership, staff frustration, positive classroom climate, caring and support to students (a combination of three environment variables: esprit, intimacy, and student-centeredness), formalization, and pupil control (pupil control ideology minus organizational ideology) (Cheng, 1993; Ming, 1994; Ming & Cheong, 1995). Leadership behavior of the principal measured by the integration of the five aspects: instructional (educational), structural (hierarchy of authority, hindrance (difficulty and obstruction) as signs of bureaucratization of a school, and participative decision), human resource, political, and cultural (symbolic) (Sergiovanni; 1984; Bush, 1986; Bolman & Deal, 1991; Cheng, 1993). Further factors included: school context, which is measured by age and size of the school; personal characteristics of students measured by age and gender; personal characteristics of teachers measured by average teacher teaching experience (teaching age), age of teacher, and gender of teacher. Additionally, teacher performance was measured by efficacy and time-use at the individual level. Students' performance was measured by learning efficacy (efficiency). Students' competition was as a function of affiliation and involvement, better social relationship among students increase the students' engagement in study (Ming, 1994; Ming and Cheong, 1995).

b) Facility Quality and Learning Efficacy

School facility are of critical importance to teaching and learning environment (Lackney, 1999). Johnson (1990a) indicated that quality of the learning environment affects teacher behavior and teacher attitudes towards teaching continuity. The physical facility is an undeniably integral part of the ecological context for learning, and has a positive influence on the bottom-line indicators of quality in education (Lackney, 1999). Physical conditions of the facility include classroom environments and school environment.

i. *Classroom Environment*

Types of education facility include classrooms, laboratories, lecture halls, and other services. Usually classroom environments have 20-35 students under the control of a single teacher. Classroom environments include class arrangement, size, natural lighting, optimal thermal conditions, and indoor air quality as follows:

a. *Class Arrangement*

Several studies indicated that classroom arrangements affect student performance, especially in relation to their distance from the teacher (Griffith, 1921; Snow, 2002); it affects their grades (Becker, Sommer, Bee, and Oxley, 1973; Holliman & Anderson, 1986; Levine, O'Neal, Garwood, & McDonald, 1980), absences (Stires, 1980), participation (Sommer, 1967), and attention (Schwebel & Cherlin, 1972). Further, seating arrangements affect visual and verbal contacts with teacher and, therefore, affect participation but not necessarily overall performance (Adams & Biddle, 1970).

b. *Class Size*

Class size points directly to a social and physical link to achievement (Achilles, 1992; Finn & Achilles, 1990). Children in smaller classes (13-17 per room) outperform those in regular-sized classes (22-25 per room). An increased density can induce stress in children thereby increasing aggressive behavior and distraction in younger children (Loo, 1976). Students take more of the responsibility for their own learning when classes are smaller; learning activities become more frequently individualized (Duke & Perry, 1978).

c. *Lighting*

Natural lighting and windows affect students' performance (Brooks & Rebeta, 1991). Students had better achievement and behaviors in classrooms with more light (Rovner, 1982; Kleiber, 1973; Mayron et al., 1974; Dunn, Dunn & Price, 1985; Ott, 1976).

d. *Thermal Conditions*

Thermal comfort, influence task performance, attention spans and levels of discomfort (McGuffy, 1982). Reading speed and comprehension and mathematical skills operations such as multiplication, addition and factoring were adversely affected by temperatures above 74 F degrees (Harner, 1974).

e. *Indoor Air Quality*

Thermal tightening of buildings for energy conservation causes a variety of pathogenic factors in children in so called 'sick' school buildings. These factors may be affecting not only performance but the overall physical health of children, as they exhibit clear signs of sensory irritation, skin rashes, and mental fatigue that potentially decrease the ability of students to perform (Evans, Kliewer, & Martin, 1991).

ii. *School Environment*

a. *Noise and Location of Schools*

Noise may decrease teaching time by forcing teachers to continuously pause or by making it difficult for the student and teacher to hear one another (Crook and Langdon, 1974). Noise negatively influence children's information processing, personal control, and arousal level (Cohen & Weinstein, 1981; Evans, Kliewer, & Martin, 1991; Berglund & Lindvall, 1986; Cohen, Evans, Stokols, & Krantz, 1986).

b. *Building Condition, Building Life-Cycle, and Facility Management*

A study by educational building conditions were hampering student performance, and estimated that improved facilities could lead to a 5.5% to 11% improvement on standardized tests (Edwards, 1991; Lackney, 1996).

c. *Schools Size*

Small schools benefit students socially and academically, while smaller school buildings consume less energy. The use of school facilities can be shared with a variety of community organizations fostering meaningful partnerships and engagement, as well as, opportunities for children to walk and bike as added health benefit (Lackney, 1999). On average, research indicates that an effective size for an elementary school is in the range of 300-400 students and that 400-800 students is appropriate for a secondary school (7-8) (Cotton, 1996). School size shows effect on the following:

- Quality of the Curriculum and Cost-Effectiveness (Howley 1994, 1996; Raze, 1985; Robertson, 1995; Rogers 1987; Rutter, 1988; Walberg, 1992).
- Academic Achievement (Bates, 1993; Burke, 1987; Eberts, Kehoe, & Stone, 1982; Eichenstein, 1994; Fowler, 1992; Haller, Monk, & Tien, 1993; Stockard & Mayberry, 1992; Summers & Wolfe, 1977; Walberg, 1992).
- Student Attitudes (Aptekar, 1983; Bates, 1993).
- Social Behavior (Duke and Perry, 1978; Garbarino, 1980; Gottfredson, 1985; Stockard and Mayberry, 1992).
- Extracurricular Participation (Barker & Gump, 1964; Berlin & Cienkus, 1989; Burke, 1987; Cawelti, 1993; Howley, 1996; Rutter, 1988; Schoggen & Schoggen, 1988; Stockard & Mayberry, 1992; Walberg, 1992).
- Attendance (Bates, 1993; Fowler, 1995; Gregory, 1992; Gregory & Smith, 1987; Howley, 1994; Smith & DeYoung, 1988; McGanney, Mei, & Rosenblum, 1989; Rutter, 1988; Walberg, 1992).
- Dropouts (Fetler, 1989; Gregory, 1992; Jewell 1989; Pittman & Haughwout, 1987; Rogers, 1987; Smith & DeYoung, 1988; Stockard & Mayberry, 1992; Toenjes, 1989; Walberg, 1992).
- Belongingness/Alienation (Burke, 1987; Campbell et al., 1981; Fowler & Walberg, 1991; Gregory, 1992; Howley, 1994; Pittman and Haughwout, 1987; Stolp, 1995; Walberg, 1992).
- Self-Concept (Grabe, 1981, Rutter, 1988; Stockard & Mayberry, 1992).
- Interpersonal Relations (Bates, 1993; Burke, 1987; Fowler & Walberg, 1991; Gottfredson, 1985; Gregory & Smith, 1982; 1983; Smith, Gregory, & Pugh, 1981; Kershaw & Blank, 1993; Pittman & Haughwout, 1987; Rutter, 1988; Smith & DeYoung, 1988; Stockard & Mayberry, 1992).
- Teacher Attitudes (Eberts, Kehoe, & Stone, 1982; Gottfredson, 1985; Gregory, 1992; Johnson, 1990b; Stockard & Mayberry, 1992).
- College Entry (Burke, 1987; Fowler, 1992; Jewell, 1989; Swanson, 1988).

III. Research Methods

The hypotheses of the study were investigated based on field research using interviews and surveys. One leader for two teams of eight assistants conducted the field research. Surveys were conducted by interviewing a sample of schools administers from the four directorates in Mafraq Governerate (Mafraq center, Northwest Badia, and Northeast Badia) representing the eighteen municipalities that included a target population of all elementary and secondary schools. Interviews took place inside the school building in the municipal office for the whole sample.

a) Hypotheses of the Study

Based on the above reviewed background, it is hypothesized that:

i. Schools located in the three different directorates offer quality and quantity in the educational facility physically differently, which impacts learning efficacy.
ii. The further schools are located from the central city (Mafraq), the less they offer quality and quantity in the educational facility physically, which impacts learning efficacy at the governorate level.
iii. Students lack competitiveness because they lack preparedness at the school level.
   a. Lack of preparedness is affected by lack of capacity of the physical entity of the school environment.
   b. Lack of preparedness is affected by lack of capacity of the physical entity of the classroom environment.

b) Sampling Technique

A stratified proportional random sample was used. Stratification was for the eighteen municipalities. The 18 municipalities (covering about 100 villages) included: (1) Greater Mafraq, (2) New Bal'ama, (3) Zaa'tri and Mansheyya, (4) Hausha; (5) Baseleyyah; (6) AsSarhan; (7) Sabha and Dafyanah; (8) Safawi; (9) Umm Alquttayn and Makeyftah; (10) Bani hashem; (11) New Rhab; (12) Mansheyyat Bani Hasan; (13) New Deyr Alkahf; (14) New Rweyshid: (15) AsSalhiyyah and Nayfah; (16) Alhusseyn bin Abdullah; (17) Khaldeyyah; (18) New Umm Aljmal.

The total number of sample frame is 337 schools of which 231 for elementary education, and 96 secondary, 8 vocational and academic, and two vocational. The proportion is suggested to be about 60%-70% of the schools distributed over the three directorates and covering all the municipalities. So from each municipality only two-thirds of the total available

schools were suggested to be interviewed from both female and male elementary and secondary schools. Randomization used the list of schools in each municipality which is alphabetically ordered. Selection was assigned randomly as every other school in the list until the proportion of 60-70% of the schools is achieved from each of the female and male elementary and secondary schools list. Final sample proportion was 67.9% with a size of 229 schools' administers. Response rate was 67.3% in Mafraq center, 42.3% in Northeast Badia, and 51.5% in Northwest Badia.

c) Questionnaire Instrument

The questionnaire included the following sections:

i. *Human Resources Capacity*
   a. *Quantity of human resources at the schools level:* (1) School capacity; (2) Available levels of study - distribution across gender and pass and fail; (3) Available fields of study; (4) High school education distribution across gender, fields of study, and pass and fail; and (5) Available teachers.
   b. *Quality of human resources at the schools level:* (1) Perception of available teaching pedagogy; (2) Directing students to choose the track they may need by providing qualified teacher who provides supervision and guidance to students; and (3) Obstacles of concentration at the Ministry of Education Level; (4) Evaluating the impact of implemented development program provided by the Ministry of Education and Ministry of Higher Educations on the local community.

ii. *Educational Facility's Physical Entities, Reflected in Quality and Quantity*
   a. *Physical entity of classroom environment:* classroom size, classroom arrangements, lighting, thermal conditions, and air quality.
   b. *Physical entity of school environment – infrastructure and services:* school size, noise location, building age.

iii. *Teaching-Organizational, Personality of the Teacher and the Student, and other Variables*
   a. *Teaching-organizational entity includes:* (1) Strength of leadership; (2) staff frustration; (3) positive classroom environment; (4) caring and support to students (esprit, intimacy, and student-centeredness); (5) formalization; and (6) students control (student control ideology-organizational ideology).
   b. *Other Variables:* (1) student attitude towards the school, student affiliation and involvement, and students' competition; (2) teacher attitude and teacher performance; and (3) Availability of Services.

iv. Learning efficacy - perceived attainment test scores of average annual in all subjects including: Science, Math, Physics, Chemistry, Biology, Geology, Computer Science, Arabic, & English.

IV. Results and Analysis

a) Descriptive Statistics

i. *Demographic Information of Interviewed Subjects*

Interviewed schools municipals were distributed over Mafraq Governerate. Location of interviewed schools from the center of the main city of Mafraq ranged from the city itself to villages located 218 km away. The average distance from Mafraq city of the sampled schools was about 29 km. Interviewed subjects were about 45% males and 55% females. Their education level ranged from college to Ph.D. and distributed as follows: Ph.D. (3.5%), Masters (17.5%), Diploma (56.3%), Bachelor (13.5%), and College (8.7%), see Table 1.

Table 1 : Frequencies Distribution of Major Characteristics of Interviewed Municipals of Schools

	Frequency	Percent	Cumulative Percent
Gender			
Male	104	45.4	45.4
Female	125	54.6	100.0
Educational Level			
Ph.D.	8	3.5	3.5
M.A./M.Sc.	40	17.5	21.0
Diploma	129	56.3	77.3
Bachelor	31	13.5	90.8
College	20	8.7	99.6
Other	1	.4	100.0
Training Workshops			
Management	25	10.9	10.9
Pedagogy	6	2.6	13.5
Computer Skills	13	5.7	19.2
Specialized	1	.4	19.7
Other	2	.9	20.5
None	12	5.2	25.8
More than One	170	74.2	100.0
Years of Service			
<5 Yrs	76	33.2	33.2
6-10 Yrs	57	24.9	58.1
11-15 Yrs	26	11.4	69.4
16-20 Yrs	29	12.7	82.1
21-15 Yrs	23	10.0	92.1
>25 Yrs	18	7.8	100.0
Place of Residence			
Same Village/City	127	55.5	55.5
Another Village	93	40.6	96.1
Another City	9	3.9	100.0
Total	229	100.0	100.0

ii. *Descriptive Statistics of the Major Study Variables*

a. *Capacity of Physical Entity of Education Facility*

1) Classroom Environment

In terms of classroom area, it ranged from 4-48 square meters. However, most of the sample (73.7%) has classroom area of 10-29 square meters. In regards to classroom size in terms of students' numbers, the numbers of students ranged from 2 to 50 students, with an average size of about 21 students, see Table 2 and Figure 1.

About half of the sampled schools (52.8%) have classroom size of less than 20 students. In regards to proper classroom size in terms of students number, most of the sample agreed on its appropriateness (71.2%). Classroom shapes were square, rectangular, and irregular. However, the most occurring shape is rectangular (58.5%) and the least is irregular (2.6%). In terms of classroom seats arrangement, most of the sample (85.6%) agreed on its appropriateness. Also, about 54.2% of the sample agreed on flexibility of classroom furniture arrangement. Further, most of the sample (72.5%) considered the attention to furniture and equipment that makes teachers store their tools appropriate. In terms of natural lighting sources, most of the sample agreed on its availability (90.8%). Number of windows in classrooms ranged from 1-8, the most frequent occurrence of number of windows is two (48.5%).

Table 2 : Characteristics of Educational Facility's Physical Entities

Variables	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Classroom Environment							
Classroom Size (Number of Students)	229	48	2	50	21.20	8.012	64.185
Classroom Area	229	44	4	48	22.95	7.246	52.506
Classroom Shape	229	2	1	3	1.64	.534	.285
Classroom Number of Windows	229	8	0	8	2.69	1.292	1.669
Classroom Additional Lighting Source	229	1	1	2	1.21	.405	.164
Classroom Heat Control	229	1	1	2	1.53	.500	.250
Classroom Cooling Control	229	2	1	3	1.74	.448	.201
Classroom Natural Ventilation	229	1	1	2	1.13	.333	.111
School Environment							
Computer Labs	229	1	1	2	1.22	.417	.174
Science Labs	229	1	1	2	1.58	.495	.245
Art Studios	229	1	1	2	1.86	.343	.118
Library	229	1	1	2	1.50	.501	.251
Indoor Sports Facility	229	1	1	2	1.88	.323	.104
Outdoor Sports Facility	229	1	1	2	1.72	.450	.202
Food Facility	229	1	1	2	1.31	.464	.215
Praying Facility	229	1	1	2	1.76	.428	.183
School Fencing	229	1	1	2	1.34	.476	.227
School Gate	229	1	1	2	1.36	.482	.232
Rest Rooms	229	1	1	2	1.08	.276	.076
School Size (Students Numbers)	229	565	10	575	179.53	116.026	13462.049
School Area	229	9443	54	9497	1637.44	2044.001	4177938.695

In terms of additional lighting sources, about two-thirds of the sample (79.5%) agreed on its presence. Thermal conditions: only about half the sample agreed on heat availability (47.2%), and about one-quarter (26.2%) agreed on cooling control availability. In regards to air quality and natural ventilation, most of the sample (87.3%) agreed on its availability in classrooms, see Table 3.

Table 3 : Distribution of the Dichotomous Sub-Variables of Educational Facility's Physical Entities

	Frequency	Valid Percent	Cumulative Percent
Classroom Environment			
Classroom Additional Lighting Source			
Yes	182	79.5	79.5
No	47	20.5	100.0
Classroom Heat Control			
Yes	108	47.2	47.2
No	121	52.8	100.0
Classroom Cooling Control			
Yes	60	26.2	26.2
No	169	73.8	99.6
Classroom Natural Ventilation			
Yes	200	87.3	87.3
No	29	12.7	100.0
School Environment			
Computer Labs			
Yes	178	77.7	77.7
No	51	22.3	100.0
Science Labs			
Yes	97	42.4	42.4
No	132	57.6	100.0
Art Studios			
Yes	31	13.5	13.5
No	198	86.5	100.0
Library			
Yes	115	50.2	50.2
No	114	49.8	100.0
Indoor Sports Facility			
Yes	27	11.8	11.8
No	202	88.2	100.0
Outdoor Sports Facility			
Yes	64	27.9	27.9
No	165	72.1	100.0
Food Facility			
Yes	158	69.0	69.0
No	71	31.0	100.0
Praying Facility			
Yes	55	24.0	24.0
No	174	76.0	100.0
School Fencing			
Yes	150	65.5	65.5
No	79	34.5	100.0
School Gate			
Yes	146	63.8	63.8
No	83	36.2	100.0
Rest Rooms			
Yes	210	91.7	91.7
No	19	8.3	100.0
Total	229	100.0	100.0

Figure 1 : Classroom Environment

2) School Environment

In terms of services, about 77.7% of the schools have computer labs, and only 42.4% have science labs, and 13.5% have art studios. On the other side, about half the sample have libraries (50.2%) school library. Further, only 11.8% of the schools have indoor sports facilities, and 27.9% have outdoor sports facilities. In addition, about two-thirds (69%) have food facility, and only 24% have praying facility. About two-thirds (65.5%) have school fencing, and about two-thirds (63.8%) have school gates, see Table 3. Most of the schools (91.7) have rest rooms, see Table 3.

School size measured by students' numbers ranged from schools that have less than 50 students (6.2%) to schools that have 500-757 students (3.2% of the sample). However, 61.1% of the schools have less than 150 students, and the most occurring school size is 150-200 students (40.7%). School area ranged from 54-10000 square meters, with the most occurring area of 200-500 square meters (39.9%). About half the sample (48%) has area of less than 500 square meters, see Table 4. Further, 79% of the sample agreed on the schools being located in a quite zone and away from noise. About half of the sample (54.6%) agreed that their schools are well maintained.

Table 4 : Distribution of the Continuous Sub-Variables of Educational Facility's Physical Entities

Variables	Frequency	Percent	Cumulative Percent
Classroom Environment			
Classroom Area			
Less than 10	8	3.4	3.5
More than 10 & less than 30	169	73.7	77.3
30 and more / less than 48	52	22.5	100
Classroom Size (Students Numbers)			
Less than 10	22	9.5	9.6
11 to 20	99	43.2	52.8
21 to 30	85	37.2	90
31 to 40	21	9.1	99.1
45	1	0.4	99.6
50	1	0.4	100
School Environment			
School Size (Students Numbers)			
Less than 50	15	6.2	6.6
50 to less than 100	31	12.9	20.1
100 to less than 150	94	40.7	61.1
150 to less than 200	20	8.3	69.9
200 to less than 250	20	8.5	78.6
250 to less than 300	15	6.3	85.2
300 to less than 400	17	7.1	92.6
400 to less than 500	9	3.7	96.5
500-575	8	3.2	100
School Area			
54 to less than 100	3	1.2	1.3
100 to less than 200	15	6.5	7.9
200 to less than 500	92	39.9	48
500 to less than 1000	22	9.6	57.6
1000 to less than 2000	30	13	70.7
2000 to less than 3000	11	4.7	75.5
3000 to less than 4000	13	5.6	81.2
4000 to less than 5000	15	6.5	87.8
5000 to less than 6000	17	7.3	95.2
6000 to less than 10000	11	4.7	100
Total	229	100	100

b. *Human Resources Capacity – distribution across gender, levels of education, number of sections and students, and pass and fail: The distribution of gender across the sampled schools was 41.05% males, 19.65% females, and 39.30% mixed genders. Education level across the sampled schools included 57.64% elementary, 10.48% secondary, and 31.88% both levels.*

c. *Teaching-Organizational Entity, Quality of Education at the School Level & Other Variables*

1) Teaching-Organizational Entity

Instructional capacity was assessed with an average of 4 and a tendency of strong agreement; structural agreement was also with an average of 4.1 and a tendency of strong agreement; staff frustration has a tendency of disproval with an average of 2.6; positive classroom environment has a slight tendency of approval with an average of 3.7; caring and support for students has a slight tendency of approval with an average of 4; formalization has a tendency of strong agreement with an average of 4.2; and students control has a strong agreement with an average of 4.2, see Table 5.

2) Quality of Education at the School Level

Perception of existing pedagogy has a slight tendency of approval with an average of 3.8; directing students to choose the right stream also received slight approval with an average of 3.5; and obstacles by the Ministry of Education concentration has a tendency of agreement with an average of 4.0, see Table 5.

3) Other Variables

Included students attitude with a tendency of slight agreement (M=3.8); teachers attitude with a tendency of agreement (M=3.98); available school services has a slight agreement with M=3.4; and perceived students' performance has a tendency of slight agreement M=3.1, see Table 5.

Table 5 : Descriptive Statistics about Independent Variables – Organizational Entity & Quality of Education & Other Variables

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Teaching-Organizational Entity							
Instructional	229	2.40	2.60	5.00	4.0170	.38732	.150
Structural	229	3.67	1.33	5.00	4.1317	.50557	.256
Staff Frustration	229	4.00	1.00	5.00	2.6288	.92454	.855
Positive Classroom Environment	229	4.00	1.00	5.00	3.7810	.77435	.600
Caring & Support for Students	229	4.00	1.00	5.00	3.9597	.65705	.432
Formalization	229	3.50	1.50	5.00	4.2329	.51498	.265
Students Control	229	2.50	2.50	5.00	4.2205	.44125	.195
Quality of Education							
Perception of Existing Pedagogy	229	3.50	1.50	5.00	3.8443	.61237	.375
Directing Students Track	229	4.00	1.00	5.00	3.4716	.98356	.967
Obstacles of Ministry Concentration	229	4.00	1.00	5.00	3.9502	.76167	.580
Other Variables							
Students Attitude	229	2.88	2.13	5.00	3.7718	.53898	.291
Teachers Attitude	229	3.33	1.67	5.00	3.9816	.54591	.298
Available School Services	229	3.89	1.00	4.89	3.3557	.66320	.440
Learning Efficacy	229	4.00	1.00	5.00	3.1009	.67052	.450

d. Learning Efficacy - Attainment Test Scores of Average Annual in all Subjects such as: Science, Math, Physics, Chemistry, Biology, Geology, Computer Science, Arabic, and English.

Learning efficacy averaged 3.1 with agreement. Meanwhile, perceived students' performance in all subjects were as follows, see Table 6:

- Science ranged from 1-5 with M= 3.2.
- Math ranged from 1-5 with M= 2.9.
- Physics ranged from 1-5 with M= 2.7.
- Chemistry ranged from 1-5 with M= 2.9.
- Biology ranged from 1-5 with M= 3.1.
- Geology ranged from 1-5 with M= 3.2.
- Computer Science ranged from 1-5 with M= 3.4.
- Arabic ranged from 1-5 with M= 3.7.
- English ranged from 1-5 with M= 2.9.

Table 6 : Descriptive Statistics about Dependent Variable – Learning Efficacy

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Overall Performance	229				3.1009	.67052	
High Performance in Science	229	4	1	5	3.23	1.023	1.047
High Performance in Math	229	4	1	5	2.85	1.066	1.136
High Performance in Physics	229	4	1	5	2.71	.896	.803
High Performance in Chemistry	229	4	1	5	2.87	.918	.842
High Performance in Biology	229	4	1	5	3.13	.923	.851
High Performance in Geology	229	4	1	5	3.18	.907	.823
High Performance in Computer Science	229	4	1	5	3.39	.854	.730
High Performance in Arabic	229	4	1	5	3.67	.835	.696
High Performance in English	229	4	1	5	2.88	1.077	1.160

b) Relationship Between Physical Entity of the Facility over Learning Efficacy & other Variables

In order to test the hypothesis that lack of preparedness is affected by capacity of the physical entity of the Classroom and School Environments in the three directorates of Mafraq Governerate and in the different villages around the governerate, the following statistical Multi-level Analysis were carried out.

i. *Correlation Tests - Physical entity of the Classroom and School Environments with Directorates and Village Distance*

a. *Directorates*

Table 7 shows a positive correlation of across the three directorates of Mafraq Governerate with attributes of additional lighting sources, natural ventilation, presence of rest rooms, and school size; and negative correlation with indoor sports facility.

Table 7 : Pearson Correlations – Directorates over Capacity of Physical Facility

Variable	Pearson Correlation North Badia Regions
Additional Lighting Source	.172**
Heat Control	.047
Cooling Control	.005
Natural Ventilation	.134*
Computer Labs	.101
Science Labs	-.069
Art Studios	-.060
Library	.076
Indoor Sports Facility	-.164*
Outdoor Sports Facility	-.015
Praying Facility	-.035
Food Facility	.083
School Fencing	.019
School Gate	.047
Rest Rooms	.131*
Proper Classroom Size	-.127
Classroom Size	-.024
Number of Students in Classroom	.118
Classroom Shape	-.004
Natural Classroom Lighting	.011
Number of Classroom Windows	.070
Seats Arrangement	.030
Classroom Arrangement Flexibility	-.093
Attention to Furniture & Equipment	-.003
School Size (Students Numbers)	.288**
School Area	.210**
School Quite Location	.102
School Maintenance	-.010

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

b. *Village Distance*

Table 8 shows a positive correlation across the different villages in Mafraq Governerate with attributes of natural ventilation, existence of outdoor sports facility, food facility, and rest rooms, and number of students in classroom.

Table 8 : Pearson Correlation - Village Distance from Mafraq City over Capacity of Physical Facility

Variable	Pearson Correlation North Badia Regions
Additional Lighting Source	.172**
Heat Control	.047
Cooling Control	.005
Natural Ventilation	.134*
Computer Labs	.101
Science Labs	-.069
Art Studios	-.060
Library	.076
Indoor Sports Facility	-.164*
Outdoor Sports Facility	-.015
Praying Facility	-.035
Food Facility	.083
School Fencing	.019
School Gate	.047
Rest Rooms	.131*
Proper Classroom Size	-.127
Classroom Size	-.024
Number of Students in Classroom	.118
Classroom Shape	-.004
Natural Classroom Lighting	.011
Number of Classroom Windows	.070
Seats Arrangement	.030
Classroom Arrangement Flexibility	-.093
Attention to Furniture & Equipment	-.003
School Size (Students Numbers)	.288**
School Area	.210**
School Quite Location	.102
School Maintenance	-.010

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

ii. *ANOVA Test – Learning Efficacy over Physical Entity of Classroom and School Environments*

Further analysis was carried out to investigate the effect of the physical entity of the classroom and school facility on learning efficacy using ANOVA Test of Variance. The test indicated significant effect on natural ventilation, existence of computer labs, science labs, art studios, indoor sports facilities, rest rooms, number of classroom windows, and school area, see Table 9.

Table 9 : ANOVA Test - Learning Efficacy over Capacity of Physical Facility

Variable	Sum of Squares	Df	Mean Square	F	Sig.
Additional Lighting Source	4.511	29	.156	.943	.555
Heat Control	9.975	29	.344	1.453	.072
Cooling Control	5.750	29	.198	.985	.493
Natural Ventilation	6.425	29	.222	2.333	.000
Computer Labs	9.058	29	.312	2.032	.002
Science Labs	12.788	29	.441	2.035	.002
Art Studios	5.018	29	.173	1.581	.037
Library	9.376	29	.323	1.344	.124
Indoor Sports Facility	4.762	29	.164	1.715	.017
Outdoor Sports Facility	7.072	29	.244	1.243	.194
Praying Facility	4.399	29	.152	.807	.748
Food Facility	7.875	29	.272	1.314	.142
School Fencing	6.802	29	.235	1.038	.419
School Gate	7.976	29	.275	1.218	.216
Rest Rooms	3.986	29	.137	2.036	.002
Proper Classroom Size	35.661	29	1.230	.834	.712
Classroom Size	1972.511	29	68.018	1.354	.118
Number of Students in Classroom	2632.487	29	90.775	1.505	.055
Classroom Shape	8.447	29	.291	1.027	.435
Natural Classroom Lighting	27.203	29	.938	1.123	.313
Number of Classroom Windows	74.168	29	2.558	1.661	.024
Seats Arrangement	37.420	29	1.290	1.228	.207
Classroom Arrangement Flexibility	64.973	29	2.240	1.152	.281
Attention to Furniture & Equipment	44.662	29	1.540	1.042	.414
School Size (Students Numbers)	456446.120	29	15739.521	1.199	.234
School Area	1.988E8	29	6854857.856	1.810	.010
School Quite Location	182.842	29	6.305	.713	.859
School Maintenance	58.845	29	2.029	1.140	.294

iii. *Regression Model for Significant Attributes of Physical Entity of Classroom and School Environments with Learning Efficacy*

The hypothesis that Learning Efficacy is affected by a set of physical entities of classroom and school facility showed significance in Table 10.

Table 10 : Multivariate Tests Model - Learning Efficacy over Significant Variables of Capacity of Physical Facility Effect

Effect Wilks' Lambda	Value	F	Hypothesis df	Error df	Sig.
Intercept	.015	1220.316[a]	10.000	190.000	.000
Learning Efficacy	.139	1.456	290.000	1827.574	.000

However, factors that contributed to the regression model in the order of their strong effect are: natural ventilation, rest rooms, science labs, computer labs, school area, indoor sports facility, number of classroom windows, and art studios, see Table 11.

Table 11 : Tests of Between-Subjects Effects - Learning Efficacy over Significant Variables of Capacity of Physical Facility

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	Heat Control	9.975[a]	29	.344	1.453	.072
	Natural Ventilation	6.425[b]	29	.222	2.333	.000
	Computer Labs	9.058[c]	29	.312	2.032	.002
	Science Labs	12.788[d]	29	.441	2.035	.002
	Art Studios	5.018[e]	29	.173	1.581	.037
	Indoor Sports Facility	4.762[f]	29	.164	1.715	.017
	Rest Rooms	3.986[g]	29	.137	2.036	.002

	Number of Students in Classroom	2632.487[h]	29	90.775	1.505	.055
	Number of Classroom Windows	74.168[i]	29	2.558	1.661	.024
	School Area	1.988E8	29	6854857.856	1.810	.010
Intercept	Heat Control	183.192	1	183.192	774.146	.000
	Natural Ventilation	110.562	1	110.562	1163.979	.000
	Computer Labs	121.298	1	121.298	789.252	.000
	Science Labs	177.698	1	177.698	819.995	.000
	Art Studios	263.977	1	263.977	2411.320	.000
	Indoor Sports Facility	269.182	1	269.182	2811.274	.000
	Rest Rooms	98.761	1	98.761	1462.587	.000
	Number of Students in Classroom	39429.236	1	39429.236	653.777	.000
	Number of Classroom Windows	599.361	1	599.361	389.227	.000
	School Area	3.125E8	1	3.125E8	82.493	.000
Total	Heat Control	592.000	229			
	Natural Ventilation	316.000	229			
	Computer Labs	382.000	229			
	Science Labs	625.000	229			
	Art Studios	823.000	229			
	Indoor Sports Facility	835.000	229			
	Rest Rooms	286.000	229			
	Number of Students in Classroom	117522.000	229			
	Number of Classroom Windows	2043.000	229			
	School Area	1.567E9	229			

V. Conclusions

a) Capacity of Physical Facility over Learning Efficacy & Geographical Location & Village Distance

Learning efficacy was associated with the following entities of the physical capacity of classroom and school facility and in the order of their strong effect: natural ventilation, rest rooms, science labs, computer labs, school area, indoor sports facility, number of classroom windows, and art studios, which supports Lackney (1999), Snow (2002), Brooks and Rebeta (1991), Griffith (1921), Becker, Sommer, Bee, and Oxley (1973), Holliman & Anderson (1986), Levine, O'Neal, Garwood, and McDonald (1980), Stires (1980), Sommer, (1967), Schwebel & Cherlin (1972), and Adams & Biddle (1970).

Further, the following entities of the capacity of physical classroom and school facility were positively correlated to directorates of Mafraq Governerate: additional lighting sources, natural ventilation, presence of rest rooms, and school size; and negative correlated with indoor sports facility, which supports Cotton (1996), Brooks & Rebeta (1991), Rovner (1982), Kleiber (1973), Mayron et al. (1974), Dunn, Dunn & Price (1985), and Ott (1976). Finally, the following entities of the capacity of physical classroom and school facility were different in relation to village distance from Mafraq City: natural ventilation, existence of outdoor sports facility, food facility, and rest rooms, and number of students in classroom, which supports Loo (1976) and Duke & Perry (1978).

b) Evaluations – SWOT Analysis

i. *Strength*

availability of all streams; teachers specialties, capacity, skills, and cooperation; small students numbers; and available electronic pedagogy.

ii. *Weaknesses*

Lack of computers; weak physical infrastructure like crowdness in some classrooms, rented buildings, and bad quality buildings; dispersed school from residential settings; lack of instruments, tools, and computers in remote schools; insufficient financial and technical capacities of school; two teaching shifts (morning and evening) and mixed schools; and travel distance for teachers and students.

iii. *Opportunities*

Improvement of physical environment, infrastructures, facilities, labs, equipment, buildings, and classrooms; separation of gender and of educational levels.

iv. *Threats*

lack of thermal control in extreme weather conditions; and lack of safe playground, school fencing, and other infrastructures.

c) Recommendations

Some schools suffer from lack of infrastructure and feel upgrading is not made possible, especially for schools who have rented buildings. It is suggested to increasing and enhancing infrastructure and services for students, teachers, and management; distributing services equally among schools; implementing safety measures at the main street in front of the schools.

Major issues that should be considered by education policy makers include:

- Emphasis of joining schools together, as it seems number of students as well as section are vital for output and more so than number of teachers. Many schools are suffering, especially in the Northeast Badia Region of Mafraq Governerate, from small number of students in geographically dispersed villages. It is healthier to increase numbers of students to a range of 20-30 per section for completion among students.
- Physical infrastructure that supports students' activity seems vital and affects student's performance positively. Therefore, it is worth to invest in sports and arts facilities, and the like.

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