

Running head: THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT
LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

**The Impact of School Infrastructure on Student Learning: A Qualitative
Systematic Review of Literature**

Symbat Maratkyzy

Submitted in partial fulfillment of the requirements for the degree of

Master of Science

In Educational Leadership

Nazarbayev University Graduate School of Education

May, 2021

Word count: 16 292

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A
QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

AUTHOR AGREEMENT

By signing and submitting this license, I Symbat Maratkyzy grant to Nazarbayev University (NU) the non-exclusive right to reproduce, convert (as defined below), and/or distribute my submission (including the abstract) worldwide in print and electronic format and in any medium, including but not limited to audio or video.

I agree that NU may, without changing the content, convert the submission to any medium or format for the purpose of preservation.

I also agree that NU may keep more than one copy of this submission for purposes of security, back-up and preservation.

I confirm that the submission is my original work, and that I have the right to grant the rights contained in this license. I also confirm that my submission does not, to the best of my knowledge, infringe upon anyone's copyright.

If the submission contains material for which I do not hold copyright, I confirm that I have obtained the unrestricted permission of the copyright owner to grant NU the rights required by this license, and that such third-party owned material is clearly identified and acknowledged within the text or content of the submission.

IF THE SUBMISSION IS BASED UPON WORK THAT HAS BEEN SPONSORED OR SUPPORTED BY AN AGENCY OR ORGANIZATION OTHER THAN NU, I CONFIRM THAT I HAVE FULFILLED ANY RIGHT OF REVIEW OR OTHER OBLIGATIONS REQUIRED BY SUCH CONTRACT OR AGREEMENT.

NU will clearly identify my name as the author or owner of the submission, and will not make any alteration, other than as allowed by this license, to my submission.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A
QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

I hereby accept the terms of the above Author Agreement.

Author's signature: Symbat Maratkyzy

Date: 07.05.2021

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A
QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Declaration of Authorship

I hereby declare that this submission is my own work and to the best of my knowledge it contains no materials previously published or written by another person, or substantial proportions of material which have been submitted for the award of any other course or degree at NU or any other educational institution, except where due acknowledgment is made in the thesis. This thesis is the result of my own independent work, except where otherwise stated, and the views expressed here are my own.

Signed: Symbat Maratkyzy

Date: 07.05.2021

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A
QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Ethical Approval



NAZARBAYEV
UNIVERSITY
Graduate School
of Education

53 Kabanbay Batyr Ave.
010000 Astana,
Republic of Kazakhstan
October 2020

Dear Symbat Maratkyzy,

This letter now confirms that your research project entitled: The Impact of School Infrastructure on Student Learning. A literature review has been approved by the Graduate School of Education Ethics Committee of Nazarbayev University.

You may proceed with contacting your preferred research site and commencing your participant recruitment strategy.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Anna Cohen Miller'.

Dr. Anna Cohen Miller

On behalf of Zumrad Kataeva
Chair of the GSE Ethics Committee
Assistant Professor
Graduate School of Education
Nazarbayev University

Block C3, Room 5006
Office: +7 (7172) 70 9371
Mobile: +7 777 1929961
email: zumrad.kataeva@nu.edu.kz

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A
QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

CITI training certificate



Completion Date 28-Jun-2020
Expiration Date 28-Jun-2023
Record ID 36611351

This is to certify that:

Symbat Maratkyzy

Has completed the following CITI Program course:

Social & Behavioral Research - Basic/Refresher (Curriculum Group)
Social & Behavioral Research - Basic/Refresher (Course Learner Group)
1 - Basic Course (Stage)

Not valid for renewal of certification
through CME. Do not use for
TransCelerate mutual recognition
(see Completion Report).

Under requirements set by:

Nazarbayev University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wd238dfc7-729f-460b-8a52-78c4cd52eec2-36611351

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Acknowledgments

I would like to express my great appreciation to my Supervisor Dr. Anna CohenMiller, who led and directed me throughout the thesis writing process. Her patience, willingness to help and support us being available any time, her way of communicating with us with care and love made us feel comfortable and supported. I would like to express my gratitude to the whole NUGSE faculty, all our course instructors who were guiding us to reach our goal in this fascinating and exciting journey and contributed to developing me as a researcher. I would like to thank our Academic English instructors Robert Gordyn and Samantha Mullins, for supporting me to progress in my thesis writing.

I would like to send many thanks to my family, my mother, and my husband, who were always with me and provided constant help and support during my thesis writing process.

I would like to thank my group mates for their encouragement throughout this journey. This thesis writing process was not easy, and nevertheless, with their inspiration and support, I could accomplish this project.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Abstract

Many schools, especially rural schools, face educational inequalities in not having access to quality education due to the poor condition of school infrastructure. Consequently, the students of rural schools are performing less in comparison with the students of urban schools. To address this issue, this thesis study aimed to identify the impact of school infrastructure on student learning in empirical studies conducted in Asian countries. The study set a goal to look at different studies' findings on the influence of various school facilities on student learning and student performance in order to highlight the significance of the condition of the learning environment for students learning. In addition, it examined the level of research area on this topic in Asian countries. Ultimately, this study explored the impact of school infrastructure, including both school-level and classroom-level infrastructure on student learning in empirical studies conducted in Asia. A qualitative systematic review of literature was conducted to answer the research question: 'What is the impact of school infrastructure on student learning in Asian countries?' The findings of this study revealed that the impact of classroom design and school's learning environment plays a major role in student learning. The results emphasized aspects related to school infrastructure including the temperature in the classroom, air velocity, school size and school type, gender-separated toilets, school library, school location, school-based management as essential aspects in student learning in studies conducted in Asian countries. Therefore, based on this qualitative systematic review of literature, school infrastructure should be taken into consideration as an important factor in student learning by the government, school leaders, and school teachers to create comfortable and better learning environments for students in all schools.

Keywords: school infrastructure, school equipment, school facilities, student learning.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Аңдатпа

Көптеген мектептер, әсіресе ауыл мектептері мектеп инфрақұрылымының нашар болуына байланысты көп жағдайда сапалы білімге қол жеткізе алмауы мүмкін. Бұл кемшілік кейде білім беру саласындағы теңсіздікке әкеп жатады. Мұндай жағдай ауыл мектептері оқушыларының қала мектептері оқушыларымен салыстырғанда үлгерім жағынан төмендеуіне әкелуі мүмкін. Бұл диссертациялық зерттеу Азия елдерінде жүргізілген эмпирикалық зерттеулер арқылы мектеп инфрақұрылымының оқушыларды оқытуға әсерін анықтауға бағытталған. Зерттеудің мақсаты – түрлі оқу орны ерекшелігінің оқушылардың оқуына және үлгеріміне әсері туралы әр түрлі зерттеулердің нәтижелерін қарастыру, сабақ процесінде оқу ортасының маңыздылығын атап өту. Сонымен қатар, жұмыс осы тақырыптың Азия елдерінде зерттелу деңгейін қарастыруды да мақсат етеді. Зерттеу сұрағы ‘Азия елдеріндегі мектеп инфрақұрылымының оқушылардың білім алуына әсері қандай?’ жауап берілу үшін әдебиеттерге сапалы жүйелі шолу жүргізілді. Зерттеу нәтижелері сынып дизайны мен мектептің оқу ортасының оқушылардың оқуына әсері зор екенін көрсетті. Сонымен қатар, нәтижелер мектеп инфрақұрылымы, сынып температурасы, ауа айналысы, мектеп көлемі және мектеп түрі, дәретханалар, мектеп кітапханасы, мектептің орналасуы, мектепті басқару сияқты тағы басқа аспектілердің оқушыларды оқытуда маңызды аспектілер екендігін анықтады. Сондықтан, барлық мектептерде мектеп инфрақұрылымын, оқушыларға жайлы және жақсы оқу ортасын құруды Үкімет, мектеп басшылары және мектеп мұғалімдері оқушыларды оқытуда маңызды фактор ретінде ескеру қажет.

Түйін сөздер: мектеп инфрақұрылымы, мектеп ғимараты, оқушы үлгерімі.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Аннотация

Многие школы, особенно сельские, сталкиваются с образовательным неравенством, не имея доступа к качественному образованию из-за плохого состояния школьной инфраструктуры. Следовательно, учащиеся сельских школ показывают более низкие результаты по сравнению с учащимися городских школ. Данное диссертационное исследование направлено на выявление влияния школьной инфраструктуры на обучение учащихся в эмпирических исследованиях, проведенных в азиатских странах. Цель исследования - рассмотреть результаты исследований о влиянии различных школьных объектов на обучение и успеваемость учащихся, чтобы подчеркнуть значимость состояния учебной среды для обучения учащихся. Кроме того, ставится задача изучить уровень исследований по данной теме в азиатских странах. Поэтому в данном исследовании рассматривается вопрос о влиянии школьной инфраструктуры, включая инфраструктуру как на уровне школы, так и на уровне класса, на обучение учащихся в эмпирических исследованиях, проведенных в Азии. Для ответа на вопрос исследования 'Какое влияние оказывает школьная инфраструктура на обучение учащихся в азиатских странах?' был проведен качественный систематический обзор литературы. Результаты исследования показали, что дизайн классной комнаты и школьная учебная среда оказывают огромное влияние на обучение учащихся. Кроме того, результаты подчеркивают другие аспекты, такие как школьная инфраструктура, температура в классе, скорость воздушного потока, размер и тип школы, отдельные по половому признаку туалеты, школьная библиотека, расположение школы, управление на базе школы, как существенные аспекты в обучении учащихся в исследованиях, проведенных в азиатских странах. Таким образом, на основании данного качественного

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

систематического обзора литературы, школьная инфраструктура должна быть принята во внимание как важный фактор обучения учащихся правительством, руководителями школ и школьными учителями для создания комфортной и лучшей учебной среды во всех школах.

Ключевые слова: школьная инфраструктура, обучение учащихся, успеваемость учащихся.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A
QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Table of Contents

Chapter I: Introduction.....	16
Background of the Study	17
Positionality	18
Statement of the Problem.....	19
Purpose of the Study.....	20
Significance of the study	20
Conclusion	21
Chapter 2. Literature Review	22
Introduction.....	22
The Impact of School Infrastructure on Student Learning	22
The Impact of Classroom Infrastructure on Student Learning	24
The Impact of School Utilities on Student Learning	27
The Impact of School Libraries, Language and Science Laboratories	27
The Impact of School Infrastructure on Teachers	29
The Impact of Student Attitudes towards School Infrastructure on Student Learning	29
Adequate School Infrastructure.....	31
Adequate Classroom Design	33
Adequate School Library, IT Centre, Laboratories, and Utilities	34
School Infrastructure Funding	35
Theoretical Framework.....	35

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Summary and Conclusion.....	37
Chapter 3: Methodology	38
Introduction.....	38
Summary and Conclusion.....	44
Chapter 4: Findings.....	45
Introduction.....	45
Section 1: School Infrastructure and Its Impact on Student Learning	47
Section 2: The Impact of School Infrastructure in Combination with Other Variables on Student Learning	50
Section 3: Perceptions of Stakeholders of the Impact of School Infrastructure on Student Learning.....	53
Section 4: The Impact of School Infrastructure Expenditure on Student Learning	56
Conclusion	57
Chapter 5. Discussion	59
Introduction.....	59
Section 1: School Infrastructure Facilities.....	59
Section 2: Learning Environment	61
Section 3: Classroom Design	63
Section 4: Libraries	66
Section 5: Modern Technology.....	67
Section 6: Teacher and Student Toilets	68

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A
QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Section 7: School Type and School Size	69
Section 8: The Location of the School	70
Section 9: Expenditure on School Infrastructure	71
Section 10: School-Based Management	72
Conclusion	72
Chapter 6: Conclusion.....	74
Introduction.....	74
Essential and Relevant Findings	74
Research Implications	75
Limitations of the Study and Recommendations for Future Research.....	76
Conclusion	77
References	78

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A
QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

List of Tables

Table 1. <i>Inclusion criteria</i>	38
Table 2. <i>The results of the findings</i>	45

List of Figures

Figure 1. *Firm Production Function*.....52

Chapter I: Introduction

Education is an important factor for human beings to improve and develop themselves. Following this, the quality of education needs to be high and available for everyone. Updating the education system and making it accessible for all is occurring worldwide. Quality education for all has been an essential issue since the adoption of the Education for All policy at the World Conference in 1990, which addressed providing quality basic education for all children, youth, and adults (Madani, 2019). Since then, different organizations and nations of the world have adopted the idea of “education for all” that emphasizes equal opportunities and access to education. According to UNESCO (2009), there are 75 million children who are not enrolled in school, and 774 million adults lacking basic literacy skills; besides, households in rural or remote communities have less access to education than others do.

One particular aspect of education for all is a lack of qualified teachers and resource shortages in rural schools that create inequality in education between rural and urban environments (Sharifullah et al., 2019). Moreover, the location and size of rural schools are not suitable enough to provide quality education to its citizens in Chile (Arayaa et al., 2012). Kazakhstan faces the same issues as mentioned above related to quality education in rural areas. National and international assessments show significant differences in student achievements between urban and rural areas (OECD, 2015). The quality of education in rural schools is a major problem in Kazakhstan’s education system, according to PISA 2012 results and OECD 2012 reports and one of the reasons for the low quality of education in rural schools of Kazakhstan can be the state of school infrastructure (Bokayev, 2016). According to MES Statistics Report (2015) (as cited in Bokayev, 2016, p. 16):

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Only 52% of rural schools have broadband access to the Internet, and the ratio of students to instructional computers is 12.6 to 1. There is a similar pattern in the number of schools equipped with new modern science labs and libraries. In addition, 93% of the emergency and old schools (191 units) and 80% of the schools without a gym (1,580 units) are located in rural areas (p. 16).

These statistics suggest that in terms of “equity in education,” “education for all” rural schools are being left behind, as they are receiving education with poor school infrastructure, which is preventing students from getting access to quality education and performing highly in their outcomes. What is more, The State Programme for Education and Science Development for 2016-2019 mentions the poor conditions of school infrastructure overall the country: “The infrastructure of general secondary education requires accelerated development” (MoSE, 2016, p. 11), and sets goals “ensuring infrastructural development of secondary education” (MoSE, 2016, p. 2). The condition of school infrastructure is being taken into consideration, as its role in student learning is crucial.

Sound school infrastructure and good quality facilities should be taken into account. They are essential for student learning and the realization of the educational goals and objectives (Sagintayeva et al., 2014). In addition, “recent studies have shown that students’ performance is enhanced in schools with better physical learning environments” (Barrett, Treves, et al., 2019, p. 5).

Background of the Study

Many studies have highlighted the role of school infrastructure in providing quality education and thereby facilitating better student performance. For example, the quasi-experimental research conducted by Belmonte et al. (2020) presents evidence from the

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

school's academic performance before and after the earthquake in Northern Italy. The findings revealed that students standardized test scores increased in Mathematics and Italian, and the effect was stronger for lower-achieving students in the school with the renewed infrastructure after the earthquake (Cuesta et al., 2016). Based on nineteen high-quality studies' findings from developed countries computers, libraries could facilitate better student performance (Cuesta et al., 2016). Moreover, adequate science laboratories, adequate water and sanitation facilities affect secondary school students' achievements (Mokaya, 2013). Lewinski (2015) emphasizes as essential factors in the classroom architecture the noise, light, temperature, and seat arrangement that affect student learning. Ventilation in the school building is another point in school infrastructure which has an impact on students' learning outcomes (Barrett, Treves, et al., 2019). Therefore, there is a need to consider the role of school infrastructure in student performance.

Positionality

The reason for my interest in this topic is my personal experience. I studied in a rural school, and the state of the school facilities was not good enough. There were no laboratories for science subjects and indoor hygiene rooms that is indoor teacher and student gender-separated toilets. Contrarily, the school where I teach has a good school infrastructure. The school has the classrooms with computers and SMART boards, science laboratories, indoor teacher and student gender-separated toilets, personal lockers for each student, a library with various resources and comfortable reading places and I noticed that it is an excellent opportunity for students to feel comfort and to develop themselves. Accordingly, I decided to examine the effect of school infrastructure on students' performance and learning.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Statement of the Problem

In order to enhance basic education quality and to assist the learning process, the schools should be equipped with well-constructed, secured, and pleasing education facilities (Cele, 2016). School architecture should respond to all students' behaviors and requirements facilitating better learning environment and improving their learning outcomes (Tanner, 2000, as cited in Mokhtarmanesh & Ghomeishi, 2019). Furthermore, all schools will want to have all of the spaces, furniture, and equipment necessary to distribute the curriculum in a successful way based on the equity policy (Barrett, Treves, et al., 2019). However, there are still gaps in school facilities; for example, heating can be insufficient, lack of laboratories for science subjects, a lack of ICT for teaching and learning processes. Because of low or no Internet connection in rural settings, teachers bring their laptops and modems to personally improve the quality of education (Kurmangaliyev, 2019). According to OECD Reviews of School Resources in Kazakhstan (2015), substantial attempts have been undertaken in recent years regarding the improvement of school infrastructure in the country. In spite of this, various issues continue to exist, such as suggested by the OECD (2015):

Old buildings that fail to heat properly in the winter, or are too expensive to heat, threaten students' health and ability to learn in one of the world's coldest climates. Schools that lack basic equipment, instructional materials or without indoor toilets are alarmingly common in rural areas. In areas with declining student rolls, school facilities that were built for a larger student population are not being used to their full capacity and require high maintenance costs. In contrast, in urban areas, two-shift schools are the norm and three-shift schools are still in some parts of the country. (p. 18)

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

It seems that more financial support is required to improve the situation (OECD, 2015). More research conducted on this topic, highlighting the role of school infrastructure in student performance, could increase the proportion of investment of national funds and call private sectors to sponsor on this issue.

Purpose of the Study

The purpose of this qualitative systematic literature review was to identify the impact of school infrastructure on student learning in empirical studies conducted in Asian countries. The study aimed to look at different studies' findings on the influence of various school facilities on student learning and student performance in order to highlight the significance of the condition of the learning environment for students learning. In addition, it set a goal to examine the level of research area on this topic in Asian countries. The following research question was conducted in the study:

- What is the impact of school infrastructure on student learning in Asian countries?

Significance of the study

The research could be beneficial in the research field on education and this exact topic. As Barrett, Treves, et al. (2019) carried a synthesis of studies that examined the impact of school infrastructure on student learning from European countries. The findings are relevant but can be implicated in European countries only. Therefore, the recommendations were to carry out similar research in a different context, as well as in different geographical locations. Consequently, it was decided to conduct the literature review on the impact of school infrastructure on student learning to analyze the studies conducted in Asian countries, as the findings of the study could be applicable for Asian countries. Moreover, it could suggest for researchers the direction for further research on

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

this research topic and for the government to think about the way of managing school resources to be beneficial for students to learn.

It could suggest researchers interested in this issue the direction to be concentrated on for future research. Moreover, the research could inform policymakers and school principals on the importance of school infrastructure in student learning which can lead to the improvement of school facilities everywhere.

Conclusion

This study explored the studies conducted in Asian countries on the impact of school infrastructure on student learning. Chapter 2 presents the literature review to cover the relevant literature on this research topic. The methodology, the process of how the studies were searched and were chosen are illustrated in Chapter 3. The findings of research revealing what the selected studies bring out on the impact of school infrastructure on student learning are presented in Chapter 4. Chapter 5 is a section for discussion of the findings referring to the literature review. Chapter 6 “Conclusion” briefly presents the core findings. It also covers limitations, implications, and recommendations for further research.

Chapter 2. Literature Review

Introduction

In this chapter, I focus on studies that investigated the role of school infrastructure in school life. When there is an issue related to school infrastructure, it is a question of its importance in school life. Different studies discuss the role of school infrastructure in student performance and learning outcomes from different perspectives. This literature review focuses on the impact of school infrastructure on student learning as a broad topic first, and then it will review its role in a detailed way paying attention to such features as classroom design, school library, and school utilities. Also this chapter discusses the impact of school infrastructure on teachers too, as the role of teachers in student achievement is the other significant factor (Darling-Hammond, 2000). In addition, students' attitudes towards school infrastructure will be discussed too. It will then discuss studies investigating what the adequate infrastructure is to facilitate better student learning and the role of school infrastructure funding. The chapter ends with a concluding summary.

The Impact of School Infrastructure on Student Learning

When it is an issue related to school infrastructure, it is a question of its importance in school life. Different studies discuss its role in student performance, learning outcomes, and motivation in teaching. For example, Cuesta et al. (2016) investigated the economics literature and the education literature published from 1990 to 2012 in both developing and developed countries to assess what exact school infrastructure has a powerful effect on student learning and enrollment referring to Latin America. According to the reviewed literature, the authors divided the school infrastructure into three categories (Cuesta et al., 2016). First is classroom-level infrastructure including such furniture and materials as

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

desks, tables, blackboards, flipcharts, and a classroom library. Second is school-level infrastructure such as overall building characteristics, the state of walls, roofs, floors, presence of a school library, and school amenities as equipment available at school, specialized rooms as science labs, availability of writing materials (pens, pencils, notebooks), the reliability of electricity, ventilated classrooms, noise level, and computers. Third is utilities, which refers to drinking water facilities, electricity, and toilet facilities. Based on nineteen high –quality studies from developed countries the result of this study showed that libraries, creating new schools and computers could lead to better student learning (Cuesta et al., 2016).

Moreover, Mokaya (2013) conducted a study to examine the influence of school infrastructure on students' performance in Kenya. The descriptive research design was applied to investigate the current situation on the concerning issues. The questionnaires containing both closed and open-ended questions were used to collect data from teachers and students of different secondary public schools. The result fulfills the list of school infrastructure affecting student performance, she highlights that adequate classroom and library space, adequate science laboratories, adequate water, and sanitation facilities affect secondary school student's achievements covering all levels of school infrastructure.

Other research, such as conducted by Belmonte et al. (2020), presents evidence from the school's academic performance before and after the earthquake from Northern Italy. They conducted a quasi-experimental research design and compared test results of students before the earthquake with poor school infrastructure and after the earthquake with renewed, modernized school infrastructure. The findings revealed that students standardized test scores increased in Mathematics and Italian language and the effect was stronger for lower-achieving students.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Moreover, a study conducted by Tanner (2008) emphasized some factors related to schools' physical environment as adequate personal space and well planned movement patterns all over the school that stands for movement and circulation, large group meeting places for social gatherings as the other essential aspects in student achievement. The findings of the study found a positive relationship between these variables.

As for the school size, Barrett, Treves, et al. (2019) found out that small schools with optimal school day have positive effect on students' performance. According to Leithwood and Jantzi the small schools affects the students' academic achievement, attendance, graduation rates, and engagement in extracurricular activities positively, as in small schools in can be beneficial for students to receive more teacher support, especially for the students with learning difficulties (as cited in Barrett, Treves, et al., 2019). Their suggestion is 300-500 students for elementary schools and 600-1000 students for secondary schools (as cited in Barrett, Treves, et al., 2019).

The Impact of Classroom Infrastructure on Student Learning

Concerning the impact of school infrastructure on student learning, Barrett, Davies, et al. (2015) decided to be concentrated on the classroom level in their study, and examined the impact of classroom design on student's learning. Based on the study the classroom for primary school students is a place where they spend much of their time and should respond to their individual needs, as with varied learning zones, interactive white board visible for everyone, and bright colours would be a stimulating factor for students. In addition, the study revealed that light, temperature and air quality, have a significant effect on students' learning and acoustics display correlation to learning progress. It emphasizes the size of windows in the classroom, as very big windows with much sunlight can cause

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

the risks of glare. Moreover, the orientation, shading control, position of openings of windows, the central-heating (to be with thermostatic control), ventilation (to be mechanical) should be taken into consideration to control overheating and poor air quality.

Aguilar (2019) also discusses the role of school infrastructure in student learning in the classroom level analyzing the acoustic design of classrooms in Chile following international standards. It demonstrated that children taught in classrooms with bad acoustics showed less academic performance and cognitive improvement. In addition, based on the international standard background noise level in primary school should not be more than 35 dB (A) and no more than 40 dB (A) in secondary school (Aguilar, 2019).

Similarly, Lewinski (2015) explored classroom architecture. He reviewed the literature based on the impact of noise, light, temperature, and seat arrangement in student performance in the classroom. He connected the findings with “telic” and “paratelic” motivation, which was developed by Apter (as cited in Lewinski, 2015). These motivations are related to how people assess their environments, what elements they favor, and how they communicate with physical surroundings (Lewinski, 2015). According to Apter, telic motivation is described as goal-oriented, and students prefer low arousal, less awakening environment in this state. It could suggest that students aim to obtain knowledge would prefer a telic state. Contrarily, paratelic motivation is activity-oriented, students pay attention to the process and they are motivated in a highly arousing environments. However, this state would be inadmissible, as it would distract students from main goals (Apter, 1982, 1984, 2014, as cited in Lewinski, 2015). After reviewing the literature Lewinski (2015) found out that most important factors in student learning are noise, temperature, and seat arrangement. Relating these findings to telic and paratelic motivation he concludes that noise can be a distracting environment for students in the telic state, not

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

giving them the opportunity to be focused, the temperature can also create an uncomfortable environment to stay goal-oriented being very cold or boiling. As for seat arrangement, he finds it disjointed, as people choose a sociopetal seat arrangement that allows interacting with each other being beneficial for students in paratelic motivation state and distracting from their main goal, learning. On the other hand, many researchers argue that classroom talk, interaction facilitates better learning. Fisher et al. (2008) explained that students' comprehension grows when they talk with collaborators reflecting their understanding of the topic or concept.

Another study related to alternative seating type in the classroom was conducted by Stapp (2018). As Wingrat and Exner state that traditional desks with limited movement breaks can cause inattention to learning and misbehaviors in the classroom (Wingrat & Exner, 2015, as cited in Stapp, 2018). The study implemented a quasi-experimental removed-treatment design with convenience sampling to identify if alternative seating using disc 'o' sit cushions could increase the time on-task behaviors (reading aloud, raising a hand, and talking to a peer about assigned work, silently reading, listening to a lecture, and looking at the board during instruction) and decreased time off-task behaviors (fidgeting in seat while not on-task, drawing or writing not related to the material, and manipulating objects not related to class, talking to other students about unrelated material, calling out answers when the teacher had not called on them, and making unauthorized comments or remarks, looking around aimlessly, staring out the windows, and passively listening to others talk about things unrelated to the assigned material) of fifth grade students during mathematics instruction (Stapp, 2018). In addition, the study applied the survey to determine the students' perceptions of this alternative seating type. The results revealed that the time on-task increased and time off-task decreased with the use of disc 'o'

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

sit cushions, suggesting that students spent more time on learning. As for the survey results, the students responded very positively to utilizing this seating type and stated that it was more comfortable than other seating types.

The Impact of School Utilities on Student Learning

A study conducted by Barrett, Treves, et al. (2019) highlighted the role of ventilation in student learning as one of the essential factors in students' enrollment. The building with poor ventilation can lead to the production of mold and the proliferation of dust mites, which can cause allergic respiratory symptoms and promote the growth of infections. According to the study results of Shendel et al. (2004) (as cited in Barrett, Treves, et al. 2019), 409 classrooms in Idaho and Washington in the US in 2004 in rooms with poor ventilation student absences rate increased by 10-20 percent. What is more, Barrett, Treves, et al. (2019) highlighted the impact of the quality of water and air in student health, which leads to missing the school, which is closely connected with student performance.

The Impact of School Libraries, Language and Science Laboratories

There is an argument that language and science laboratories play an important role in the student learning process. As for language laboratories, Balamayuranathan (2019) argues that modern language laboratories can be a sufficient tool for all four language skills and reduce the workload of teachers. Softwares for writing can easily correct student mistakes and provide feedback on their work and students can do different exercises online independently. In addition, it is an opportunity for students to listen to a variety of accents additionally to teacher's accent, and they can practice their pronunciation, accent accuracy with the help of software application that recognizes voices (Balamayuranathan, 2019).

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Concerning science labs Saadon et al. (2011) stated that learning mathematical sciences at computer labs allows students to apply the knowledge immediately and visualize the picture through display leading to better comprehension and increased motivation in learning.

The role of library in student learning is emphasized in several studies. Omenyo (2016) conducted a case study to explore the role of school library in teaching and learning in Accra, Ghana. In order to investigate the issue the interviews, focus group discussions were conducted with teachers, students, a librarian, administration. Additionally, observation and analysis of documents were used. Based on the findings all students affirmed the necessity of a library in their school, as they mentioned the school library provided them with books and other materials to improve their learning. The students without books used the library to do their homework. Some students used the library to do research for their class assignments getting access to various resources. Others used it to review materials for their examination, to expand their knowledge on the topic learned in class, and to be prepared for different competitions. The teachers highlighted the importance of school library listing the following reasons as the school library facilitates students to read books, to do research, to acquire knowledge. Moreover, the teachers stated that it helps students to develop independent learning skills, it is the center of academic works and motivates students to learn, and it provides a studying space for students. A proper reading environment with available books and learning resources is essential for the learning and teaching process (UNICEF, 2009).

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

The Impact of School Infrastructure on Teachers

There was mentioned above some effects of school infrastructure in the teaching process related to workload. How modern language laboratories can be helpful to substitute teachers in some aspects as writing software. Studies by researchers, such as by Buckley, Schneider, and Shang 2004 and Thomas and Pasquale 2016, based on the teachers' perceptions of staying or leaving the school because of the school infrastructure condition showed that teachers prefer the school with adequate school infrastructure, no matter how high the salary is (as cited in Barrett, Treves, et al., 2019). The teachers and school leaders agreed strongly with the fact that school building assists to choose the school, to stay in their job and stimulate to continue working there for long (Shmis et al., 2020). The well-planned school facilities influence teacher hiring, teacher retention and teacher's dedication, contrarily, because of poor quality of indoor air, improper lighting, bad acoustics and dense classes, teachers can change the school or even the profession (Erickson, 2018). What is more, Shell (2015) examined the effects of the physical environment on teacher satisfaction. The findings revealed that background noise level, lighting, and floor are good predictors of teacher satisfaction.

The Impact of Student Attitudes towards School Infrastructure on Student Learning

Montessori points out the priority of the sense in the learning process. When the school is with broken windows or dirty floor and there is another pretty school nearby students can feel social indignation (as cited in Barrett, Treves, et al. 2019). The students' attitudes towards their school are formulated from the school's culture, how they distinguish their learning experience, and the culture affects student behavior, engagement, communication, and character (Erickson, 2018). Moreover, Berry (2012) expands the idea

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

of putting the procedure in an ordered manner. He declares that there is a strong link between the school environment and learning outcomes and categorizes it as interconnected, correlated process:

- Environmental quality in schools is determined by facilities management systems.
- Attitudes of students, teachers, and staff are shaped by the quality of the school environment
- Learning and teaching behaviours are affected by attitudes.
- Performance is affected by behaviour.
- Educational performance determines future outcomes of individuals and society as a whole (Berry 2012).

The role of school infrastructure in student learning and teacher's work is enormous based on the studies' findings. Every detail in school infrastructure may affect the students' achievements significantly. According to the studies' results creating new schools and modernized schools, adequate classrooms, libraries, adequate science labs, and adequate water and sanitation facilities, could affect students' learning. Moreover, personal spaces, places for social gatherings, and considering movement patterns in schools had positive impact on students' achievements. The air quality, ventilation, central heating, quality of water are also related to students' performance as the quality of these facilities connected to students' health. Acoustics, light, temperature, seat arrangement have an impact on students' learning regarding the fact that not proper condition of them being uncomfortable can distract students' attention from learning. As for the library and science labs, these places facilitate better learning and stimulate the students to acquire the knowledge independently. The condition of school infrastructure may affect both the teachers and

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

students' attitudes towards the school. Teachers prefer working in schools with well-planned and adequate school infrastructure. Students' engagement and behavior are affected by school environment. Therefore, school infrastructure and student learning is closely correlated with each other.

Adequate School Infrastructure

If it is considered that adequate school infrastructure is a key to student performance, there are numerous suggestions recommended by various studies. According to Cele (2016) examples of adequate school infrastructure should be as listed below:

- Acceptable proper space for each and every learner as recommended by ethics confirmed by a country's Education Ministry;
- Appropriate learner classrooms for 30-40 learners space with effective teaching space for lesson presentation and learner tasks;
- Building systems that approve the students' safety at school related to natural features of the area the school is located;
- Adequate separate sanitary facilities for boys, girls, and staff;
- Internet network (Cele, 2016).

Some studies explored the adequate condition of the school infrastructure based on governmental reports related to school facilities. Consequently, Wodon (2016) conducted a study to explore the school infrastructure in Paraguay analyzing the needs, investments, and costs, and in order to figure out the state of the school infrastructure Wodon (2016) refers to the school infrastructure census implemented in 2008 by the Ministry of Education and Culture of Paraguay. The point to highlight is that in order to assure

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

appropriate key infrastructure in schools, Paraguay has adopted (like many other countries) standards for its schools, and The Ministry of Education and Culture declared that all schools should have:

- (i) a direction room; (ii) a secretarial room; (iii) at least one classroom (7.2 meter \times 7.2 meter) per grade with proper ventilation and light; (iv) separate bathrooms for boys and girls; (v) a proper space for recreation and physical education; (vi) drinking water; and (vii) a library (as cited in Wodon, 2016, p. 5).

According to the recommendations on adequate school infrastructure presented above, both studies highlight the classrooms one considering effective teaching and learning space (Cele, 2016), proper ventilation and light, separate sanitary facilities for boys and girls (Wodon, 2016). Another mentioned aspects are safe building system, internet network, proper space for each learner (Cele, 2016), a direction and a secretarial room, proper space for physical education, drinking water and a library (Wodon, 2016).

According to UNICEF (2009), there are three key components of child-friendly school design that are crucial in child development – safety, health, and nutrition. UNICEF (2009) designed the manual of ‘child-friendly school’, and its main idea is to address the complex perception of quality and absolute needs of children as a learner. Based on this manual, there should be structurally stable and weatherproof buildings, separate spaces for faculty personnel that assure students and teacher privacy, fresh potable water, separate hygiene facilities, separate toilets for boys, girls and personnel. Schools should be located far from the traffic, industrial noise, pollution sources, the colours should be light, and natural ones, electricity should be provided. Emergency, evacuation plans, and Clinic cabinets should be part of the school design. Beautifying and filtering the sun, dust, and

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

noise trees and flowers should be planted in the school compound as trees also have a calming effect. Tanner (2013) emphasized the naturalness in school design stating that built and natural aesthetic surroundings affect students' welfare and academic achievements positively.

These are general characteristics of adequate school infrastructure presented in these studies. Further, the recommendations on each of these aspects will be presented.

Adequate Classroom Design

The classroom design is considered to be one of the most important factors in student learning and many researchers pointed out its significance in student performance. According to Begi classroom furniture should be of the right size, attractive and safe (as cited in Kariuki & Ndani, 2019). Pile recommends that the color of the classroom should be of strong colors with warm tones, as for lighting Peters claims that it should be at least one window in the classroom (as cited in Kariuki & Ndani, 2019). Tanner (2013) referred to many studies regarding the impact of physical environment on student learning.

Connecting to Salk's beliefs regarding spacious, unobstructed laboratory spaces that could be adapted to ever-changing needs, the physical environment and human performance are directly related. Human health and behavior are strongly affected by many factors including environmental and technological dynamics. Students need room to move about and not feel restrained by congested spaces. Ample movement and circulation patterns have direct positive effects on reading comprehension, language arts, mathematics, and science (Tanner, 2009). Wohlwill and Van Vliet (1985) discovered that the consequences of high-density conditions

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

that involve too many children and too little space are excess levels of stimulation plus stress and excitement (as cited in Tanner, 2013, p. 33).

The design of child-friendly classrooms should be with good fresh-air circulation and 20 percent window area shaded from the direct sunlight including ‘children’s home-base’ that is the space in or near the classroom, which allows students to have privacy keeping their properties in lockable storage (UNICEF, 2009).

Adequate School Library, IT Centre, Laboratories, and Utilities

As for facilities, library should be with proper reading space and available books and learning resources. Moreover, library and IT centre should be equipped with computers and access to the internet for students and community to receive advantages from the World Wide Web (UNICEF, 2009). Laboratories for natural sciences should be separate classroom or special area in the classroom with teacher space, display space, clean-up space, storage for equipment, a preparation room for experiments, natural ventilation and solar shading (UNICEF, 2009)

The toilets should be gender-separated for teachers and students with soap or other cleaning stuff, moreover, for female teachers and adolescent girls, there should be enough place to wash and dry clothes regarding their particular needs.

According to the recommendations presented above the schools with weatherproof buildings, separate spaces for faculty personnel that assure students and teacher privacy, fresh potable water, separate sanitary facilities with soap or other cleaning staff, toilets for boys, girls, and staff, and light, natural colours, electricity, internet, computers, clinic cabinets, library are considered adequate regarding the infrastructure. As for the location, being far from industrial noise, traffic, and pollution sources, and trees and flowers around

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

are recommended as basic factors. The classrooms suggested to be with effective teaching and learning space, proper ventilation and light, with safe, attractive and right size furniture, at least one window, allowing the students free movement. The library and IT centre with internet connection, the laboratories separate from classroom, gender separated toilets with enough place to wash and dry clothes are other recommendations presented in studies.

School Infrastructure Funding

Regarding the spending on school infrastructure, Pons et al. (2015) mentioned in their study of school resources in Kazakhstan that poor condition of school infrastructure can affect the quality of education, and that Kazakhstan's 2013 public spending per student is necessarily lower than OECD average. It suggests allocating proper spending per student and it can lead to adequate infrastructure in schools. Therefore spending on school infrastructure can have its effect on students' achievement. The results of the study conducted by Conlin and Thompson (2017) revealed that investment in school infrastructure have positive impact on students' academic achievement. The paper examined the expenditure on school infrastructure in 231 schools in Ohio between 1997 and 2011 and its effect on student performance and housing prices. Regarding the student performance, the construction of new and renovated buildings was beneficial for students increasing their learning outcomes. Moreover, the study suggested that the improvements in building quality affected the students' enrollment decisions.

Theoretical Framework

The Theory of Justice by Rawls (Matson, 2020) was chosen as the theoretical framework for this study. I was informed of this theory in the work of Kurmangaliev

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

(2019). Kurmangaliyev (2019) used this theory regarding inequality in education taking place in rural schools in Kazakhstan. The quality of internet connection was poor in rural schools and some schools had no internet at all (Kurmangaliyev, 2019). According to Rawls, the idea of justice is correlated with fairness (Matson, 2020). Rawls determines the two main principles of justice. The first principle demands equality in everyone's basic rights and responsibilities, while the second states that social and economic inequalities are acceptable just only if they end up being beneficial for everyone (Matson, 2020).

I relate the Theory of Justice to my study as the reason for researching the impact of school infrastructure on student learning is to highlight the importance of school infrastructure and the essence of its condition in school life, particularly in rural areas. In Kazakhstan, rural schools are equipped with poor school infrastructure based on MES Statistics Report (2015) (as cited in Bokayev, 2016). Moreover, OECD (2015) reviews on school resources in Kazakhstan also states that "schools that lack basic equipment, instructional materials or without indoor toilets are alarmingly common in rural areas" (OECD, 2015, p. 18). It creates inequality between urban and rural schools regarding the access to quality education. The problem exists not only in Kazakhstan but in other countries too: Sharifullah et al. (2019) state that lack of qualified teachers and resource shortage in rural schools create inequality in education between rural and urban environments in Pakistan. Every student no matter the geographical position should have equal rights, and equal access to education. Quality education for all has been an essential issue since the adoption of the "Education for All" policy at World Conference in 1990, which considers providing quality basic education for all children, youth, and adults (Madani, 2019) and emphasizes equity in education, equal opportunities and access to education. Rural schools should be taken into consideration concerning the condition of the

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

infrastructure of the school. As recent studies have shown that, a better physical learning environment strengthens student performance (Barrett, Treves, et al., 2019).

This theoretical framework helped me to understand and to evaluate the role of school infrastructure in student learning as presented in the Discussion chapter of this thesis study.

Summary and Conclusion

The literature reviewed regarding the impact of school infrastructure on student learning and adequate condition of the school infrastructure makes it clear that school infrastructure can vary from school to school. However, there are basic features, which are mentioned in almost all resources as important. Starting from school level facilities such as water, sanitation, library space, science laboratories, indoor gender-separated toilets, ventilation and safety of the building, lighting, internet connection ending with the design of a classroom that includes noise, temperature, and seat arrangement in the classroom all play an efficient role in student performance. The more facilities and more comfort are provided the more it can be beneficial for students supporting their well-being. The impact of school infrastructure in student learning is enormously based on the studies' findings. Therefore, more studies are needed to be conducted on this issue, especially in Kazakhstan and Central Asia, in developing countries that are on the way to improve their educational systems to provide everyone equally with high-quality education. The next chapter will present the methodology applied in this study to select the studies to be reviewed to.

Chapter 3: Methodology

Introduction

This chapter will describe the methodology applied in this study. First, I will discuss the inclusion criteria applied in this study to select the relevant studies, and then the searching process in each database will be described. The chapter ends summary and conclusion. The basis for the structure of the methodology part was adapted from the work of Wollscheid et al. (2016). In order to select the studies to be analyzed the criteria were defined first based on the purpose and the research questions of the study. The purpose of this qualitative systematic literature review was to identify the impact of school infrastructure on student learning in empirical studies conducted in Asian countries. The research question was: What is the impact of school infrastructure on student learning? The inclusion criteria consisted of seven aspects: *population, topic, outcomes, setting, study design, resource source, and date range*. “Population” stands for the participants of the studies that were analyzed, “topic” means the topic of those studies, their focus of investigation. Another one is “outcomes”, the variables to be monitored in the studies selected. Next is “setting”, the place the studies were conducted. As for the “study design”, it is the research design of the studies; resource source is the databases where the studies were searched. Lastly, date range stands for the date of the studies that were analyzed. The inclusion criteria are introduced in a detailed way explaining why these aspects were included in Table 1 below.

Table 1

Inclusion Criteria

Population	Primary(1-4 th grade), secondary (5-9 th grade) and	As the research question focuses on school infrastructure, it was important
------------	--	---

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

	high (10 th -11 th grade) school students	that all studies specifically address schools. This means that when selecting studies, I included only those addressing primary (1-4 th grade), secondary (5-9 th grade), and high (10-11 th grade). The grades were pointed out as it can differ through countries, like primary school could start from kindergarten in some countries.
Topic	Identifying the impact of school infrastructure on student learning	The topic is identified based on the research purpose and the research question. The research question and the research purpose concentrate on the impact of school infrastructure on student learning.
Outcomes	Student performance, student motivation, student attitudes	As the impact of school infrastructure on student learning could be determined by students' performance, their motivation to learn, their attitudes towards school infrastructure, the outcomes were selected as student performance, student motivation and student attitudes.
Setting	The studies conducted in fifty Asian countries defined by UN (n. d.): Afghanistan, Armenia, Azerbaijan, Bahrain, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, China, Macao Special Administrative Region, China, Hong Kong Special Administrative Region, Cyprus, Democratic People's Republic of Korea, Georgia, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Oman, Pakistan, Philippines, Qatar, Republic of Korea, Saudi Arabia, Singapore, Sri Lanka, State of Palestine, Syrian Arab Republic,	The studies conducted in Asian countries were selected, since the purpose of the study is to identify the impact of school infrastructure on student learning in empirical studies conducted in Asian countries.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

	Tajikistan, Thailand, Timor-Leste, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, Viet Nam, Yemen.)	
Study design	Empirical studies	As empirical research is considered to be one of the most authentic and competent research designs (“Empirical Research: Definition, Methods, Types and Examples”, n.d.), it was decided to make a selection on empirical studies
Resource source	ERIC, Web of Science, ScienceDirect, Google Scholar, ProQuest Dissertations and Theses Global, and NU repository.	It was concluded to search the studies from peer-reviewed academic journals from international online databases, which are popular and, I am familiar with that can ease my searching process, and the access is available due to the opportunity provided by the NU library.
Date range	Any date range.	The date range was not established in order not to restrict the search result, to have as many results as possible.

The search was conducted in the selected international online databases including ERIC, Web of Science, Science Direct, Google Scholar, NU Repository in December and January 2020-2021. Then in order to continue the data collection, ProQuest Dissertations and Theses Global was included, of which access was possible due to the opportunity provided by the NU library.

The search strategy combined relevant keywords within the topic of the impact of school infrastructure on student learning with the use of Boolean operators AND and OR and truncation “*” to cover variations in the keywords. Keywords were ‘school infrastructure’, ‘school facilities’, ‘school equipment’, ‘student learning’, ‘student outcomes’, ‘student performance’. Search strategy example was applied like this, for example in the database ERIC: "school infrastructure*" OR "school facilities*" OR

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

"school equipment*" AND "student performance*"OR "student learning*" OR "student outcomes*". These terms were chosen because the focus of this study is the impact of school infrastructure on student learning.

Results in ERIC. In order to get more results an advanced search was chosen. The search was done through keywords or terms only, no other searching fields were included as “author”, “journal title”, etc. From search modes, “to find any of my terms” was turned on in order not to miss any relevant source on the research topic, and from expanders “apply equivalent subjects” was chosen. No other limitations were chosen. In the line of keywords” "school infrastructure*" OR "school facilities*" OR "school equipment*" AND "student performance*" OR "student learning*" OR "student outcomes*" was written. Overall 63, 688 studies (as of 24th of December 2020) were shown by the search result. Results were sorted by relevance. Results per page were 30. This database was reviewed until reaching page 90. Every page and every study on each page was reviewed carefully as detailed below.

Studies were chosen based on the title, reviewing the abstract and sometimes scanning whole works. First, the title was taken into consideration, if it related to the research topic or not. If not the next study was reviewed. If it was related, then the study's country was examined to see if it matches the criteria. It was easier when the title included the setting, where the study was conducted, and participants. After the abstract was scanned, if the abstract does not provide complete information regarding the population, the research design or on any other criterion on the study, the whole work was scanned carefully. Moreover, there was a need to check the conformity of school ages based on criteria, as primary, secondary, and high school students' age can vary in different countries. Seven studies were chosen related to the topic. Only one study analyses the

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

correlation of school infrastructure and students learning outcomes, others examine the role of school infrastructure in student learning mostly in combination with other factors as teachers, school location or learning materials, and overall classroom atmosphere as a student-student relationship.

What is more, they examine the relationship of school infrastructure and school choice, or student' perceptions, not exactly student performance. However, all these studies were chosen to be analyzed in this literature review, as they can also show the significance of school infrastructure in student learning because all these factors are correlated with each other in school life. In addition, there is another issue related to the research topic. There are lots of studies conducted in European countries, but not many studies conducted on this concern in Asian countries. Therefore, it was hard to find studies examining only the relation between school infrastructure and student learning. Accordingly, the studies investigating the role of school infrastructure combined with other variables were selected for review.

Results in Web of science. The database required searching in the following style, including "TS" that stands for Topic: TS = ("school infrastructure*" OR "school facilities*" OR "school equipment*" AND "student performance*" OR "student learning*" OR "student outcomes*") and with brackets. No other limitations were included. The result presented overall 19013 works. Results were sorted by relevance. The result per page was 10. This database was reviewed until page 30, 301 works. However, no studies were found based on the inclusion criteria (24th of December). It was decided to move onto the other database due to a lack of time.

Results in Google Scholar. The search term was as in ERIC: "school infrastructure*" OR "school facilities*" OR "school equipment*" AND "student performance*" OR "student learning*" OR "student outcomes*". Overall, 16,900 studies

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

showed the results. Results were sorted by relevance. The result per page was 10. This database was reviewed until page 20. Overall, five studies were found. Two studies that refer to the criteria and two topic-related studies were found. Two studies are related to the topic in some ways, as their focus is not only school infrastructure, but in combination with other variables, they examine the effect of school facilities on student learning as one of the variables that could affect student outcomes. One study conducted by Chan (1988) was not available on Google Scholar. There was no access to the whole work. Based on the short abstract and the authors' surname, the study is suitable for the criteria, and it is from ERIC. It was decided to search it in ERIC. In ERIC, it was available via interlibrary loan. The interlibrary loan was submitted (31.01.2021). However, as a result, this was not an empirical study but just an article discussing this issue, and therefore it was excluded.

Results in Science Direct: "school infrastructure" OR "school facilities" OR "school equipment" AND "student performance" OR "student learning" OR "student outcomes". In this database, the wildcards (*) were deleted, as the database does not support it. Overall result was 31, 926. Results were sorted by relevance, and 50 works were per page. The database was reviewed until page 5. Two studies that suit the criteria according to the abstract were chosen. However, access to the full text was not available. There was a need to consult a librarian. Later these two studies were available with the help of a librarian.

Results in NU Repository- no suitable studies were found.

Results in ProQuest Dissertations and Theses Global. Due to the lack of studies found in the databases chosen before ProQuest Dissertations and Theses Global was included to revise. This database was chosen in order to search from the comprehensive collection of dissertations and theses. Keywords to search were: ("school infrastructure") OR ("school facilities") OR ("school equipment") AND ("student performance" OR "student performances") OR ("student learning") OR ("student outcomes"). Due to the

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

search tips of this database, brackets were used for each term, and truncation marks were deleted, as it helps to modify the search and find what is needed exactly. The result showed overall 178,935 works (31.01.2021). Results per page were 50. The database was reviewed until page 10. One study was found based on the inclusion criteria. No other suitable studies were found.

Overall, in order to review deeply, fifteen studies were selected because they fit the inclusion criteria. Simultaneously, in the process of studying intensely and writing the descriptive analysis of the studies, two studies were excluded as the findings and the population were not related to the research topic. Moreover, it occurred that two studies were the same, but with some changes in the title and two different years. So the latest year was chosen. Furthermore, one study was just an article on the topic, not an empirical study. After this exclusion, eleven studies remained to be analyzed further.

Summary and Conclusion

The main goal of this chapter was to describe the process of collecting data relevant to this study. Aspects included identifying the purpose of the research, the research design, the research questions, the inclusion criteria, the resource sources, and selecting the relevant studies for this research. The design of this research is a qualitative systematic review of literature. From data collection across six number of databases, the resultant number of studies for inclusion included eleven studies. The next chapter will provide the information on the findings of the studies from this research in a descriptive way.

Chapter 4: Findings

Introduction

The aim of this chapter is to present the findings of this research that is to describe the studies selected. The findings will be presented in a descriptive manner including the authors, year of publication, country, title, journal name, participants, study design, and main outcomes, as it was organized in Wollscheid et al. (2016). It will be organized in a way of combining to different categories based on the variables of the studies: (1) School infrastructure and its impact on student learning, (2) The impact of school infrastructure in combination with other variables on student learning, (3) Perceptions of stakeholders of the impact of school infrastructure on student learning, (4) The impact of school infrastructure expenditure on student learning. The summary of the findings of this qualitative systematic review of literature is illustrated in the table below (Table 2). The chapter ends with a conclusion.

Table 2

The result of the findings

Subheadings	Authors and year of publication	Country	Study population	Findings
School infrastructure and its impact on student learning	Ruhyana and Aeni (2019)	Indonesia	Primary school students	Schools that had damaged classrooms and double shift system increased the students' chance of repeating a grade, schools that had applied MBS decreased the students' chance of repeating a grade. Damage of the other facilities and infrastructure (teacher toilet, student toilet, and library) did not affect students' chance of

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

				repeating a grade (Ruhyana & Aeni, 2019).
	Ariani and Mirdad (2016)	Iran	First grade students from public and private high schools	School design affects student performance.
	Nepal (2016)	Nepal	Secondary school teachers and students	School's learning environment, school infrastructure facilities have found significantly association with student learning outcome.
	Wang et al. (2020)	China	13 years old students	Air velocity in the classroom affects student performance.
The impact of school infrastructure in combination with other variables on student learning	Rahim (2018)	Pakistan	Grades 1-5	School size, multigrade schools are significant predictors of children's numeracy and English reading skills
	Suryadarma et al. (2006)	Indonesia	Students of 4 th grade.	Quality of school facilities predicts better performance.
Perceptions of stakeholders on the impact of school infrastructure on student learning	Altamimi (2017)	Saudi Arabia	Teachers of Public schools	The physical attributes of the school facilities as well as the perceptions of school facilities are related to student performance
	Dogan and Dogan (2018)	Turkey	Students of 4 th grade	Physical expectations about the classroom design: A single study table, a private locker, an interactive smartboard, colorful furniture and design, fancy bulletin boards, a tidy environment (Dogan & Dogan, 2018).
	Alsaudi (2015)	Saudi Arabia	Parents of private and public schools	Parents prefer the schools with library services, modern technologies, computer services, good laboratories for computers and sciences, the

				classrooms with a good environment (enough lights, comfortable tables and nice carpet, air conditioning, heating), a good theatre, and places for outdoor and indoor games (Alsauidi, 2015).
	Alswilem (2019)	Saudi Arabia	Secondary school English teachers	Using modern technology at English lesson motivates students to learn based on the teachers' view.
The impact of school infrastructure expenditure on student learning	Kyriakides et al. (2019)	Cyprus	Public secondary schools expenditure	Investment in specific types of equipment had a significant effect on student learning outcomes.

Section 1: School Infrastructure and Its Impact on Student Learning

This section presents the studies that focused exactly on the impact of school infrastructure on student learning. Ruhyana and Aeni (2019) used a quantitative research method to identify the effect of educational facilities and infrastructure on primary school students' learning outcomes in Indonesia, Sumedang Regency in September 2018 and the research was published in Elementary School Forum journal in 2019. The data were taken from the Dapodik Data, Education Data Centre in 2017/2018 Academic Year. The research population involved 599 primary schools in in Sumedang Regency. Logistic regression was applied to analyze the data that relates one or other independent variables and a dependent variable with the category. The dependent variable was students' learning outcomes, the independent variables were classroom, teacher toilet, student toilet, library, MBS (school-based management), and double shift system. As for the findings, the results showed that schools that had damaged classrooms increased the students' chance of

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

repeating a grade by 6.3% compared to schools that did not have damaged classrooms.

Schools that had applied MBS decreased the students' chance of repeating a grade by 7.9% compared to schools that had not applied MBS (Ruhyana & Aeni, 2019). Schools that had applied a double shift system increased the students' chance of repeating a grade by 7.2% compared to schools that had not applied a double shift system (Ruhyana & Aeni, 2019).

Damage of the other facilities and infrastructure (teacher toilet, student toilet, and library) did not affect students' chance of repeating a grade (Ruhyana & Aeni, 2019).

Ariani and Mirdad (2016) conducted mixed-method research to examine the influence of school design (learning and teaching space) on first grade student performance in Iran, Mashhad city. The study was published in *International Education Studies* journal in 2016. The participants were 150 Iranian first grade students from two public and one private high schools. The qualitative part was carrying interviews to evaluate school design (the attitude of the students towards school design) with 13 items, and contained a ten-point Likert scale. In order to examine the interaction between school design and student performance quantitative research method was applied, descriptive analysis was employed. The findings of this study revealed that physical learning spaces are essential to all students, as it provides comfort to the learning environment with the aid of technology and sound architecture. Another finding was that students of public schools pay less attention to the physical learning environment in comparison with the students of private schools. Therefore, private school students' performance is better than public school students' performance. Moreover, the study revealed that students pay more attention to movement and circulation. The main finding of this study is that school design affects student performance.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Nepal (2016) conducted quantitative research method to analyze the relationship among school's infrastructure facilities, learning environment and student's outcome in several districts of Nepal. The study was published in *International Journal for Research in Social Science and Humanities Research* in 2016. The analytical research design was adopted and cross-sectional data was collected to evaluate the comparison between school's infrastructure facilities, learning environment and students' outcome. The sampling population was the secondary school teachers and students, 160 students, 160 teachers from selected 40 schools. The data collection instruments were Likert scale questionnaires. The data was analyzed using SPSS 20, the Multi regression test was applied to test the relationship between school infrastructure facilities, learning environment and students' outcome. The findings revealed that school's learning environment, school infrastructure facilities have found significantly association with student learning outcome.

Wang et al. (2020) conducted an experimental study to examine the possible influence of indoor air velocity on students' learning performance in summer conditions in Change City, Henan Province, China. The study was published in *Energy and Building Journal* in 2020. As for the methodology, the experiments were conducted in August from the beginning of summer vacation, when students were not at school. The experimental room size was $L \times W \times H = 5 \times 4 \times 3 \text{ m}^3$. The indoor temperature was regulated using a split-type air conditioning. The experimental conditions were 26°C and 29°C. The learning performance test had 12 items, including four categories questions: perception, attention, memory-learning, and thinking. In order to evaluate the results of each test reasonably accuracy (ACC), reaction time (RT, and learning performance (LP) that combines the effects of accuracy and response time were considered and was calculated in

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

this way: $LP = ACC \times (1/RT)$. There were 13 years old 12 participants, 6 male and 6 female students. They had to do performance test in 6 different experimental conditions. The main results of the study are that the effect of air velocity on different types of test tasks was related to do the test tasks, and with the increase in air velocity, the learning performance decreased; with the increase in air velocity, all physiological parameters showed a downward trend; learning performance increased as the thermal satisfaction votes increased (Wang et al., 2020).

Section 2: The Impact of School Infrastructure in Combination with Other Variables on Student Learning

In this section the studies investigating the impact of school infrastructure in combination with other variables as teacher's attendance or qualification on student learning are presented. Rahim (2018) conducted the quantitative research to examine the school resources associated with learning outcomes. The study was conducted in Pakistan. The research was published in Excellence in Education Journal in 2018. In order to answer the research question What factors are associated with learning outcomes? a multiple linear regression analysis was conducted. The data was taken from two data sources as Education Management Information System (EMIS) obtained from the Ministry of Elementary and Secondary Education, Government of KP; and b) the Annual Status of Education Reports (ASER), which is available online, and is an NGO- sponsored, large-scale national household survey about the quality of education in rural and some urban areas of Pakistan (Rahim, 2018). The dependent variables were the rate of proficiency in reading Urdu, reading English, and basic mathematics. The independent variables were school location (urban/rural), amenities, medium of instruction, teachers' attendance, academic and professional qualification, school size, PTR (Kindergarten/kachi-grade 2), PTR (grades 3-

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

5), multigrade schools and, school gender (Rahim, 2018). Three hundred and sixty one schools were chosen as research population and two school-level was chosen first early grades (Kindergarten/kachi–grade 2) and another higher grades (grades 3–5). The analysis revealed that when the school size increased it affected the students' numeracy and English skills negatively, and students' performance in mathematics decreased by nearly six percentage points in multigrade schools. As for the school location, there is no positive correlation between school location and student performance. The same with physical resources (Rahim, 2018). Overall findings of the study is school size, multigrade schools, teachers' qualification and teachers' attendance are significant predictors of children's numeracy and English reading skills whereas teachers' qualification and teachers' attendance, were found significant across all the three proficiency levels--reading Urdu, reading English and two-digit subtraction (Rahim, 2018).

Suryadarma et al. (2006) conducted a study to examine the correlates of student performance in mathematics and dictation tests in Indonesia. The study was published in Education Economics Journal in 2006. The data for this study was obtained from the survey conducted by the SMERU Research Institute in cooperation with World Bank. The data collection process was divided into two separate rounds, in October 2002 and February 2003. The research sites were visited twice to improve accuracy. Eight provinces were chosen randomly to conduct the survey, out of 30 provinces in Indonesia. Then 10 districts were chosen after stratifying, five rural (Gowa (Southern Sulawesi), Lombok Tengah (West Nusa Tenggara), Rejang Lebong (Bengkulu), Magelang (Central Java), and Tuban (East Java)), and five urban (Cilegon (Banten), Bandung (West Java), Surakarta (Central Java), Pasuruan (East Java), and Pekanbaru (Riau)). 10 villages were chosen in each district; up to three primary schools were chosen in these villages, including both

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

private and public schools. Ten students of fourth grade were selected randomly in each of 110 schools; totally, 1089 students were briefly interviewed and tested (Suryadarma et al., 2006).

This study applied an adopted version of a common firm production function (Figure 1).

Figure 1

Firm production function

$$\text{Ln } S_{ij} = F (G_{ij}, Q^P_{ij}, \text{Ln } Q^T_j, \text{Ln } Q^S_j, \text{Ln } F^S_j, u)$$

Note. The figure was used to examine the correlation of mathematics test and dictation scores with student performance by Suryadarma et al. (2006).

where S_{ij} is the score in mathematics and dictation tests of the i th student in the j th school, and the independent variables are: G_{ij} , the gender of the student; Q^P_{ij} , a matrix of the characteristics of the student's parents; Q^T_j , a matrix of the teacher's characteristics in the j th school; Q^S_j , a matrix of the quality of the j th school; and F^S_j , any fees received by the j th school from both the government and the parents—while u is the error term in the model. We include district fixed effects in the regression, and, since each district is either an exclusively urban or rural area, there is no need to include dummy for rural areas in the model.” (Suryadarma et al. p. 409)

As for the findings of Suryadarma et al. (2006), it reveals that teacher absenteeism is indeed a significantly negative correlate of student performance, while quality of school facilities predicts better performance, and schools where at least one working toilet girl

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

students performed better on the mathematics test. However, some school facilities such as a library, a playground and electricity had no significant correlation with students' mathematics scores and dictation test. Similarly, no significant coefficients was found in finance variables. It also emphasizes a significant non-monotonic concave relationship between the pupil– teacher ratio and student's mathematics performance.

Section 3: Perceptions of Stakeholders of the Impact of School Infrastructure on Student Learning

This section describes the selected studies that examined the perceptions of stakeholders of the impact of school infrastructure on student learning. Altamimi (2017) examined the relationship between school facilities on student performance from the Saudi Arabia, Ad-Dilam School District teachers' perspectives. The study was taken from ProQuest Dissertations and Theses Global. This was a descriptive study. The research questions were: What are the teacher's perceptions regarding the school facilities' relationship to student performance? What are the teachers' perceptions regarding the adequacy of the facilities to support the learning environment? A survey was used to collect the data. It had three sections. First section was about the teacher's personal and employment information. The section two included items about the teacher's perceptions on the relationship between school facilities and student performance. In section three the survey included items about the facilities of schools where they work (Altamimi, 2017). The six point Likert scale was applied from strongly agree to strongly disagree. The findings show that the physical location, physical facilities, general attractiveness of the facilities, ventilation of the classrooms, classroom density, lighting, colors of the learning environment, and modern teaching techniques are related to learners performance. In conclusion, the physical attributes of the school facilities as well as the perceptions of

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

school facilities by teachers are related to student performance (Altamimi, 2017). Altamimi (2017) presents the limitations of the studies as the findings is limited to the Ad-Dilam School District. Additionally, the participants are male teachers in all-male schools and female teachers in all-female schools, as in Saudi Arabia schools above kindergarten are divided between genders. There was no observation or expert reports on the subject included in this study.

Dogan and Dogan (2018) carried out a case study to identify the classroom environment that 4th grade students visualized. The study was conducted in Istanbul, Turkey and was published in Universal Journal of Educational Research in 2018. The participants were 114 4th grade students of one public school in Istanbul. Researchers used as the data collection tool to ask the students to write a composition about the classroom environment in their dreams in forty minutes. The compositions were collected and content analysis method was used to analyze the data (Dogan & Dogan, 2018). According to students desire of the classroom environment the analysis revealed two main headings: Physical expectations and Emotional expectations (Dogan & Dogan, 2018). A single study table, a private locker, an interactive smartboard, colorful furniture and design, fancy bulletin boards, a tidy environment and a clean environment were the general physical expectations of the students from the classroom environment whereas positive social relations with friends, positive communication with the teacher and the sense of success were the general emotional expectations of the students. Additionally, it was found that the students expressed a variety of opinions on technological possibilities, emergency measures, security and discipline (Dogan & Dogan, 2018).

Alsauidi (2015) conducted a descriptive research to examine the effect of the school facilities factor and sport activities factor on parents in terms of private and public school

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

choice at Riyadh City Saudi Arabia. The study was published in Universal Journal of Educational Research in 2015. The research questions were: Does the strength of the school facilities factor affect parents' decisions to enter their children into public or private schools in Riyadh, KSA? Does the strength of the sport activities factor affect parents' decisions to enter their children into public or private schools in Riyadh, KSA? Why do parents select particular private or public school for school facilities factor and sport activities factor? Two methods were used to collect the data: questionnaires and Focus Group interview instrument to understand why parents choose private or public for their children (Alsaudi, 2015). Fifteen schools (eight private and seven public schools) were randomly selected. The student population from the selected eight private schools and seven public schools was 6,554. The findings revealed that the most important educational facilities factors that influenced parents to choose a school are the school has good library services, the school has modern technologies, computer services, good laboratories for computers and sciences, the classrooms have a good environment (enough lights, comfortable tables and nice carpet, air conditioning, heating), the school has a good theatre (Alsaudi, 2015). The most important physical education factors that influenced parents to choose a public school or a private school are similar: the school has outdoor games; the school has good indoor games. Other factors mentioned by parents were medical care and meeting rooms (Alsaudi, 2015). Parents emphasized the role of school infrastructure in school choice, as they state that school infrastructure influences students' learning attitudes (Alsaudi, 2015).

Alswilem (2019) conducted a mixed research method to examine Saudi English teachers' perceptions about the use of ICT in classroom, to distinguish challenges in using ICT, and collecting suggestions on classroom use. The study was published in Advances in

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Language and Literary Studies Journal in 2019. The data was collected employing the questionnaire with a five-point Likert scale and included open-ended questions to obtain a better understanding of the matter. The research population covered secondary English teachers in Al-Jouf education district in Saudi Arabia, 43 secondary schools of boys, and 46 secondary schools of girls. The responding schools' number was 67. The total number of secondary school English teachers responding the survey was 201 (62 male teachers, 139 female teachers) (Alswilem, 2019). The findings revealed that the teachers have positive attitude towards using technology in the classroom. They believe that using modern technologies at English lesson motivates students to learn. However, they announced various challenges to have a broad use. They mention about a) the lack of teacher training, b) the lack of infrastructure (labs and classrooms), and c) the lack of technology resources (computers) (Alswilem, 2019). The survey results proposed the need for a clear vision and strategy for technology use. Additionally, the teachers suggested that creating a standardized physical infrastructure in coexistence with financial stimulus could help to improve acquisition (Alswilem, 2019).

Section 4: The Impact of School Infrastructure Expenditure on Student Learning

The section describes the impact of spending on school infrastructure on student learning. Kyriakides et al. (2019) investigated the link between educational expenditures and student learning outcomes in Cyprus. The study was published in International Journal of Educational Development in 2019. According to the aims of the study, a secondary analysis of data that was collected by the Ministry of Education in Cyprus was conducted . The data was related to various types of spending of all public secondary schools and students' learning outcomes for five years were received for analysis. Separate multilevel regression analyses of student performance in the university entrance examinations during

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

five consecutive school years were conducted and changes in the effectiveness status of secondary schools were identified. Subsequently, Discriminant Function Analysis (DFA) was used to investigate the extent to which changes in school expenditures could predict changes in the effectiveness status of schools (Kyriakides et al., 2019). These variables were used in the analysis: at the student level: gender of students participating in the Pancyprian examinations; at the school level: the percentage of girls, the number of Socioeconomic Status (SES) students; Educational expenditures: building additions/improvements/extensions (expenditures on constructions of new schools, new classrooms, sports rooms, IT rooms, and demolitions); equipment for laboratories and special classrooms (expenditures on preparing laboratories and special classrooms, including purchase of instruments, sports equipment, equipment for Biology and Physical laboratories); heating/air conditioning; I.T. computers (computers, printers, video projectors and additional IT equipment); Grants provided by School Boards including spending on school supplies, cleaning products (Kyriakides et al., 2019). As for the core findings, it occurred that all these variables have significant effects on student achievement for each school year and investment in specific types of equipment had a significant effect on student learning outcomes in the case of Cyprus. Particularly, expenditure changes in laboratory equipment, special classrooms, and in IT/computers could predict changes in school effectiveness status, promoting student-learning outcomes (Kyriakides et al., 2019).

Conclusion

The major findings of this qualitative systematic review of literature on the context 'The impact of school infrastructure on student learning in empirical studies conducted in Asian countries' is that school design, school's learning environment, school infrastructure facilities, quality of school facilities affect student learning. Based on this thesis studies'

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

findings, parents and teachers agree with this argument and emphasize the role of school infrastructure in student performance linking to students' learning attitudes. Therefore, parents choose the schools with library services, modern technologies, computer services, good laboratories for computers and sciences. Moreover, the classroom design, double shift system, school-based management, air velocity in the classroom, school size, multigrade schools are related to student learning. As for the library, modern technologies, student toilets, school infrastructure spending not all studies have identified positive correlation between these variables and student learning. Nevertheless, in the following Discussion chapter research, such as by Barrett, Treves, et al. (2019), Tanner (2013) are highlighted in their significance to student learning.

Chapter 5. Discussion

Introduction

In the previous chapter, the findings of this research were presented in a descriptive manner. This chapter will discuss these findings. In this discussion chapter, the research question of this study “What is the impact of school infrastructure on student learning?” and the findings of the systematic review of literature of research specific to the context "impact of school infrastructure on student learning in empirical studies conducted in Asian countries" are considered together referring to the literature review. The Theory of Justice by Rawls (Matson, 2020) will be discussed through the chapter to understand the role of each school facility in student learning highlighting its equal availability in all schools. The chapter is organized in a way starting broadly, looking at school infrastructure as a whole system, to detailed features as classroom, library and others. There are 10 sections described below as important regarding the findings related to school infrastructure of the selected studies: (1) School infrastructure facilities, (2) Learning environment, (3) Classroom design, (4) Libraries, (5) Modern technology (6) Teacher and student toilets, (7) School type and school size, (8) The location of the school, (9) Expenditure on school infrastructure, (10) School-based management. The chapter ends with a concluding point.

Section 1: School Infrastructure Facilities

According to the findings of this thesis study, it was revealed that there was a slight relationship between school infrastructure and student learning when the school infrastructure is concerned as one variable responding to all types of school facilities. Nepal (2016) found a significant association between school infrastructure facilities and student learning outcomes. Belmonte et al. (2020) agree with the findings revealing the

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

increase in students' test scores with renewed and modernized school infrastructure.

Similarly, Ariani and Mirdad (2016) found out that school design have an impact on student learning. However, in Rahim's (2018) study, school amenities (physical resources) had no significant impact on students' proficiency level in bivariate correlation analysis. Suryadarma et al. (2006) found similar results. It revealed that some school facilities such as a playground and electricity had no significant correlation with students' mathematics scores and dictation test, on the other hand Suryadarma et al. (2006) state that the quality of school facilities predicts better performance. If we refer to participants' perceptions regarding this issue from this thesis study, we discover a close correlation between school facilities and student performance.

The study investigating the teachers' perceptions of the impact of school facilities on student learning revealed that participants believe in the relation of student learning with the school facilities (Altamimi, 2017). Teachers affirm that student performance is related to the quality of the educational facilities, student attendance is related to school building conditions, improvement in school facilities is related to student behavior. They state that well-maintained school facilities help students feel secure, which is supported by research by Altamimi (2017). Altamimi (2017) justified these findings bringing the constructivism theory of Steffe (1995) explaining the importance of teachers' experiences as past practices stimulate future performances (as cited in Altamimi, 2017). Based on Alsaudi's (2015) study, parents are concerned about the quality of furniture and the general welcoming learning environment in school, as they believe its effect on students' learning attitudes. Parents highlight school facilities' significance in school choice and choose well-equipped schools with modern technologies, computer labs, science labs, theatre, medical care, and meeting rooms. Parents mention the features as colorful environment,

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

comfortable chairs and tables, air conditioning, places for indoor and outdoor games.

Parents play an essential role in learning too. Their involvement in students' school accelerates fewer behavioral problems and better academic performance (Yigzaw, 2019).

Based on the findings mentioned above, only one of the studies examining directly the relation between school infrastructure and student learning could find significant association between them. In addition, teachers and parents believe in school facilities' impact on student learning. Their perceptions are vital and need to be taken into account as teachers and parents have their role in students' learning processes. Therefore, we can conclude that there is a slight relationship between school infrastructure and student learning as shown within the Asian context when investigating the school infrastructure as one variable without dividing into details.

Section 2: Learning Environment

The impact of the learning environment on student learning is crucial based on the findings of this thesis study. The learning environment should be safe, convenient and beautiful, inducing students' excitement to learn.

Nepal (2016) affirms the importance of the learning environment in student learning; his study revealed a significant association between learning environments like supportive environment, child-friendly environment, safe and sound environment, and the students' total outcome. Ariani and Mirdad (2016) in Iran revealed an exciting fact that students of public schools pay less attention to the physical learning environment in comparison with the students of private schools. Simultaneously, private school students' performance is better than public school students' performance. However, the results showed that physical learning spaces are essential to all students (Ariani & Mirdad, 2016). The study highlights the importance of school design on student performance, as it

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

provides comfort to the learning environment with the aid of technology and sound architecture. Ariani and Mirdad (2016) support their findings with the argument that people seek out beauty, an educational space should create a feeling of excitement to learn when the students get in and facilitate creative thinking, and that learning in a convenient physical and educational environment inserts a sense of pride and success.

Moreover, Montessori agrees with this perspective, stating that when the school is with a broken window and dirty floor, and there is another school nearby with good infrastructure, students feel social displeasure, and it can affect students' learning as sense plays a role in the learning process (as cited in Barrett, Treves, et al. 2019). Based on MES Statistics Report 93% of the emergency and old schools (191 units) in Kazakhstan are located in rural areas (MES Statistics Report, 2015, as cited in Bokayev, 2016). Regarding the second principal of the Theory of Justice by Rawls, social and economic inequalities are acceptable just only, if they end up being beneficial for everyone (Matson, 2020). These old schools in rural areas are creating inequalities in education and are not beneficial for students as reported in the studies above. Saudi Arabia teachers believe in the relevance of the quality of the learning environment in student performance (Altamimi, 2017). UNICEF (2009) emphasizes safety, health, and nutrition as the critical components of child-friendly school design.

The arguments mentioned above highlight the essence of the school learning environment in students' learning process that their feeling of safety and convenience is interconnected with their learning outcome. Therefore, the design of the learning environment should be considered beneficial for students' learning process.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Section 3: Classroom Design

The findings of this thesis study revealed that the impact of a classroom design on student learning is enormous. The furniture, the temperature, the quality of air in the classroom, the aesthetic design and the size of the classroom, and students' individual preferences related to classroom design all play an important role in student learning.

One of the selected studies conducted by Ruhyana and Aeni (2019) investigated the impact of different educational facilities, including the classroom, on primary school student's performance in Indonesia using logistic regression. Based on the findings, the schools with damaged classrooms increased the students' possibility of repeating a grade by 6.3% in comparison with schools that did not have damaged classrooms. Ruhyana and Aeni (2019) state that classrooms as an external factor could affect students' learning outcomes. If the classroom was in a good condition, then students were able to be focused on and comfortable with the learning. Conversely, if the classroom was damaged, it could raise students' worry because of close to collapse ceiling being uncomfortable and students would be not concentrated. Begi agrees with this perception emphasizing that classroom furniture should be of the right size, attractive and safe (as cited in Kariuki & Ndani, 2019). In addition, they suggest the government take instant action to fix them, not to intervene in the learning process. The findings of the other selected study conducted by Ariani and Mirdad (2016) in Iran revealed that students pay more attention to movement and circulation. "Students need room to move about and not feel restrained by congested spaces." (Tanner, 2013, p. 33). Altamimi (2017) found out that teachers believe in the relation of classroom density and student learning. The size of the classroom should be designed allowing students free movement.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Wang et al. (2020) conducted a study to investigate the effect of air velocity in the classroom on student performance testing two temperature environments (26 and 29 degrees Celsius, 78, 8 and 84, 2 in Fahrenheit). Based on the findings, the increase in air velocity was not beneficial for students. The learning performance decreased with the increase in air velocity, and it lessened faster in 26 degree environments. Participating students preferred a warmer environment and had better performance. Consequently, learning performance is related to air velocity in the classroom and thermal satisfaction votes. It suggests a need to pay attention to air velocity in the classroom. Besides, students prefer the environment, which is comfortable for them to show better performance. Lewinski (2015) emphasizes the role of temperature in student learning, as it can create a not convenient environment being hot and boiling, distracting students' attention. Air ventilation in the classroom is essential in student performance because poor ventilation can cause the production of mold and the proliferation of dust mites, leading to the growth of infections and decreasing students' attendance (Barrett, Treves, et al., 2019).

According to Dogan and Dogan (2018), primary students' physical expectations of the classroom desks are different (white, pink, yellow, colorless). However, most of them preferred the desks to be personal and of different colors. Some of them preferred it to be as large as for two or three pupils and soft, the special place for pencils, water bottles, even special desks for boys and girls were the other answers. As for the lockers, the students want their own cupboards and need hangers to hang their bags and coats. They want their closets to be locked, more cabinets in the classroom to put their books inside. UNICEF (2009) points out the lockable storage for students to keep their properties as part of a child-friendly learning environment. In addition, in Dogan and Dogan (2018), most of the students preferred to have SMART boards in the classroom instead of a standard board,

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

and they must be more extensive and more. Some students mentioned that they would like a standard board with chalk and should be in a place for everyone to see. The classroom walls should be colourful, painted, patterned, with the pictures of birds-butterflies and flags, the windows to be round, wide, fully open, colourful, automatic were the students' preferences (Dogan & Dogan, 2018). As for the classroom's aesthetic design, most of the students mentioned having enough boards that are informative, including national values and a corner of friendship with hearts and flowers, an area of library and playground with various books and cushions, toys, and other gaming materials in the classroom (Dogan & Dogan, 2018). The other expectations of the students were security, having cameras in the classroom, air conditioning, a class full of materials, educational stuff on the walls to hang and a comfortable class (Dogan and Dogan, 2018). As for the parents, they choose schools with classrooms that are good, clean, with sufficient lighting and pleasant carpeting (Alsauidi, 2015).

The design of the classroom is one of the important factors in student learning regarding the arguments presented above. It needs to be comfortable and not damaged (Ruhayana & Aeni, 2019) with enough space for students to move (Ariani & Mirdad, 2016). The temperature in the classroom should be warmer and comfortable for students to show better performance (Wang et al., 2020). There should be individual desks with special area for water bottles and pencils, personal lockers, colourful walls, SMART boards visible for everyone, area of friendship, area of library and playground according to primary students' perceptions (Dogan and Dogan, 2018). The classroom for primary school students should be designed concerning their individual needs, as it is a place where they spend much of their time stimulating their learning (Barrett, Davies, et al., 2015). Consequently, we could conclude that the classroom design has a positive impact on student learning.

Section 4: Libraries

The results of this thesis study revealed two different viewpoints regarding the role of school library on student learning. One of them state that libraries do not affect student performance; others affirm its impact on student learning. However, other studies that investigated this issue could confirm the positive effect of school libraries on student learning.

Ruhyana and Aeni (2019) explained that damaged libraries did not affect students' chance of repeating a grade. Suryadarma et al. (2006) also revealed no significant correlation between the availability of libraries and students' math scores and dictation tests. However, school libraries are essential for student learning, as they use them in their study, to do research on class assignments, to review materials for their examination, to expand their knowledge on the topic learned in class, and to be prepared for different competitions (Omenyo, 2017). Moreover, teachers believe that the school library develops students' independent learning (Omenyo, 2017). Parents believe that one of the crucial items in school choice is that the school has good library services (Alsauidi, 2015). Cuesta and others (2016) state that school libraries could lead to better learning. Correspondingly, Mokaya (2013) argues that library space affects secondary school students' achievement. Despite this fact, only half of rural schools have libraries in Kazakhstan (Bokayev, 2016) and students in some rural schools are facing inequalities, not receiving their basic rights as presented in the first principal of the Theory of Justice by Rawls (Matson, 2020).

According to the findings of the studies, there occurred contradicting results regarding the impact of school libraries on student learning. However, while discussing similar studies we could approve the essential role of the library in student learning. Proper reading environment with available books and learning resources is essential for the

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

learning and teaching process (UNICEF, 2009). Accordingly, the schools with well-equipped libraries with a lot of learning and teaching resources would support a better learning environment for students.

Section 5: Modern Technology

According to the findings of this systematic literature review, modern technology appears to be useful for students' learning process based on students', teachers', and parents' viewpoints. However, there is no powerful evidence of its impact on student learning in this research.

Based on teachers' perceptions Implementation of modern teaching techniques used in the school facilities are related to student performance, as using flexible illustration via SMART boards builds everlasting visual impression in students (Altamimi, 2017). Parents believe that using modern technologies in the classroom motivates students attracting them to the lesson, emphasizing the information, and it allows them to be involved in students' studies (Alsauidi, 2015). English Teachers of Saudi Arabia believe that using technology in teaching English motivates students to learn the language (Alswilem, 2019). However, there are some barriers to using them in the classroom. Teachers mention as barriers lack of training courses, infrastructure issues, and lack of technology resources and suggest creating physical infrastructure as labs and classrooms (Alswilem, 2019). Moreover, students preferred using advanced technology at the lessons, watching 3D videos, using tablets instead of books and notebooks, having internet on tablets, and the smart board giving the lecture when the teacher is busy, automatic seats in classrooms (Dogan & Dogan, 2018).

In this research, the role of modern technologies in student learning is emphasized based on the participants' perceptions. Teachers and parents believe that using modern

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

technologies motivates students to learn. Additionally, students prefer using advanced technology in the classroom. However, OECD (2015) found that moderate use of computers could accommodate learning outcome, on the other hand it had some negative effects as it can distract valuable teacher-student interaction, which facilitates deep, conceptual understanding and higher-order thinking (as cited in Barrett, Treves, et al., 2019). Consequently, it can be concluded that there is no strong evidence of the impact of modern technology on student learning in this research.

Section 6: Teacher and Student Toilets

The findings of this thesis study revealed opposing each other results regarding the impact of toilets in student learning. Nevertheless, the role of adequate, gender-separated toilets in student learning is highlighted by other studies.

According to Ruhyana and Aeni (2019), damaged teacher and student toilet did not affect students' chance of repeating a grade. However, they claim that it is one of the essential facilities in school due to health reasons. The students are to have good instructions on utilizing it and keeping it clean. It would bring them comfort and health. Suryadarma et al. (2006) found out that schools with at least one functioning toilet performed higher on the mathematics test, and it is related to girls, not boys. Cele (2016) points out that adequate, separate sanitary facilities for boys, girls, and staff are one of the criteria for adequate school infrastructure. UNICEF (2009) states that 'child-friendly schools' should have gender-separated toilets, and for female teachers and adolescent girls, there should be enough place to wash and dry clothes due to their particular needs. OECD (2015) reported that most of the rural schools are without indoor toilets in Kazakhstan. Absence of indoor toilets in rural schools is another inconsistency with the Theory of Justice by Rawls, as it creates not beneficial for rural students inequality (Matson, 2020).

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

The existence of gender-separated toilets could be beneficial, especially for girls, for their comfort and health, which can affect their learning (Barrett, Treves, et al., 2019). As even one functioning toilet could influence particularly girls' performance on mathematics test (Suryadarma et al., 2006). Consequently, there is a need to realize the existence of gender-separated indoor toilets especially in rural schools.

Section 7: School Type and School Size

The school type and school size have an impact on student performance according to this thesis study's findings. Based on the findings, schools should be small, without double shift, and not multigraded.

According to Ruhyana and Aeni (2019), the schools with a double shift system had more students repeating a grade compared to the schools without a double shift. They explain the reason of it regarding the fact that students' comprehension skill is lower in the afternoon because of tiredness, sleepiness, and lack of concentration, same with teachers would happen, they are tired after morning classes referring to Sriyanto (2016) (as cited in Ruhyana et al. (2019)). The study conducted by Rahim (2018) revealed that if the school size increased, it affected students' numeracy and English skills negatively, explaining it as teachers can provide an individual approach in small schools that facilitates students to feel care and support (McMillen, 2000; Ready & Lee, 2006; Zoda, Combs, & Slate, 2011, as cited in Rahim, 2018). As for a multigrade school, students' performance in mathematics decreased by nearly six percentage points in a multigrade school (Rahim, 2018). Similarly, Barrett, Treves, et al. (2019) found out that small schools, optimal school day length have a positive effect on student' academic outcomes.

Based on the findings revealed it could be concluded that the school size and school type are related to student learning and should be taken into consideration due to the

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

aspects as small schools are beneficial for students to receive enough teacher support, in a double shift system students and teachers are not concentrated enough in afternoon classes because of tiredness, and multigrade schools affect negatively students' performance.

Section 8: The Location of the School

The findings of this systematic review of literature revealed two viewpoints regarding the influence of school location on student learning, as one of them confirming its relation to student learning, the other findings no positive correlation between school location and student performance. Nevertheless, other studies suggest considering the location of schools to benefit student learning.

Based on teachers' perceptions, the location of the school is related to students' motivation to learn (Altammimi, 2017). However, Rahim (2018) finds out no positive association between school location and student performance; it can be because of fewer urban schools (2%) than rural schools (98%). The point to consider regarding the school's location is that it should be located far from the traffic, industrial noise, and pollution sources (UNICEF, 2009). Moreover, schools located in acceptable travel distance have a positive effect on student's academic performance (Barrett, Treves, et al., 2019). Arayaa et al. (2012) state that the location of rural schools is not suitable enough to provide quality education to its citizens in Chile. This statement suggests that quality education is not accessible in some rural schools and the students are experiencing injustice and inequality not supporting the Theory of Justice by Rawls, as this inequality is not beneficial for them (Matson, 2020).

As a concluding point, it could be considered that school location is another important issue in the student learning process regarding the point that it should be located

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

far from the traffic, industrial noise, pollution sources, and in acceptable travel distance to have a positive impact on student learning.

Section 9: Expenditure on School Infrastructure

The findings of this thesis study exposed various arguments related to the impact of spending on school infrastructure. It occurred that if it is examined as the correlation of the expenditure on school infrastructure and student learning there is no positive correlation between them. However, when it is investigated separately as the impact of expenditure on laboratories on student learning, it has positive impact on student learning.

Ariani and Mirdad (2016), based on their findings, suggest that Iranian school planners should pay attention to school infrastructure as the school is a place where students spend most of their time and not decrease expenses on school infrastructure. Suryadarma et al. (2006) found no significant coefficients in all finance variables (government transfer, school fees) with students' performance. However, Kyriakides et al. (2019) found out that different types of expenditures have a significant effect on student achievement during each year. Kyriakides et al. (2019) state that expenditure on equipment for laboratories, special classrooms, and IT/ computers can have an impact on the learning process. Pons et al. (2015) affirm that proper spending per student could lead to adequate school infrastructure.

The discussion above on school expenditure suggests various findings on its effect on student learning. Accordingly, there is no strong evidence of its impact on student learning if it is examined as one not separated variable. However, if it is investigated separately, as expenditure on a special type of school facility it has a significant effect on student learning. It could suggest that schools can spend on the school infrastructure requiring improvement. An example for this case could be not having enough equipment

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

for science laboratories, therefore investing on the equipment for science laboratories could be beneficial for students' learning.

Section 10: School-Based Management

The findings of this thesis research revealed that only one study investigated the impact of school-based management among the selected studies and it found positive impact of school-based management on student performance. According to Ruhyana and Aeni (2019), the schools with school-based management decreased the students' chance of repeating a grade in comparison with the schools without school-based management. They discuss it relating to the autonomy and authority of school principal in determining the most beneficial school policies connected to school infrastructure. In other words, if the school principal would have an autonomy on school management, he or she could identify advantageous school policies related to school infrastructure and facilities, as the principal would know the area of improvement and would work on it as a result of the autonomy.

Conclusion

This chapter was focused on discussing the findings of this thesis research as connected to literature reviewed. The research question of this study and the findings were explored referring to the literature review. The chapter was organized starting from broad topic and narrowed to specific issues. The key points were: (1) School infrastructure have slight impact on student learning when it is considered as one variable, (2) The learning environment affects student learning and should be safe, convenient and beautiful inducing students' excitement to learn, (3) The impact of classroom design is enormous on student learning, especially the furniture, the temperature, the quality of air in the classroom, the aesthetic design and the size of the classroom, and students' individual preferences related to classroom design, (4) The impact of school library in student learning is not fully proven

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

having contradictory results, however other studies emphasize its role in student learning

(5) Modern technology appears to be useful for students' learning process based on students', teachers', and parents' perceptions, (6) The impact of toilets in student learning is not proven having contradictory results, however other studies highlight its role linking to students' health, (7) The school type and school size have an impact on student performance and schools should be small, without double shift, and not multigraded, (8) The correlation of school location and student performance have contradicting results, nevertheless, other studies suggest considering the school location beneficial for students learning, (9) The expenditure on all school infrastructure have no impact on student learning, when it is examined separately as expenditure on laboratories, special classrooms, and IT/ computers it has an impact on the learning process, (10) The findings of this thesis research revealed that only one study investigated the impact of school-based management among the selected studies and it found positive impact of school-based management on student performance.

The infrastructure of rural schools require consideration according to the Theory of Justice by Rawls (Matson, 2020), as they are experiencing educational inequalities as most of rural schools are old, without indoor toilets, and library. The next chapter presents the conclusion for the thesis where the substantial findings will be summarized and presented with limitations, research implications and recommendations for future studies.

Chapter 6: Conclusion

Introduction

The previous chapter discussed the findings in a detailed way, referring to the literature review chapter. This chapter summarizes the results of this qualitative systematic review of literature on the topic of ‘The impact of school infrastructure on student learning in studies conducted in Asian countries. First, it presents essential and relevant findings that are related to the research question ‘What is the impact of school infrastructure on student learning?’ In addition the research purpose identifying the impact of school infrastructure on student learning, including various school facilities, and to examine the level of research area on this topic in Asian countries is discussed. Second, it discusses the implications of this thesis study. Thirdly, it will consider the limitations of this thesis study.

Essential and Relevant Findings

The result of this qualitative systematic review of literature revealed that the most essential and relevant findings are related to the research question and the research purpose include five key points:

1. There is a slight relationship between school infrastructure and student learning within the Asian context when examining it as one variable without dividing it into separate school facilities.
2. The learning environment has a positive impact on student learning, and its role in student learning is enormous. The learning environment should be safe, beautiful, and convenient, inspiring students to learn.
3. The classroom design has a positive impact on student learning. It needs to be comfortable and not damaged, with enough place to move, the temperature should

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

be warmer and comfortable to be beneficial for students' learning. Moreover, it is suggested to refer to the students' preferences regarding the classroom design, especially for primary school students as they spend more time in their classroom (Barrett et al., 2019)

4. School type and school size affect student learning. Small schools, the schools without double shift, and not multi-graded affect students' performance positively.
5. Library, modern technology, student toilets, the location of schools, expenditure on school infrastructure, and school-based management were other aspects examined for the relationship with student learning in the empirical studies conducted in Asian countries. Not all studies could identify a positive correlation between these variables and student learning.

As for the research area on this research topic in Asian countries, from the selected six databases (ERIC, Web of Science, ScienceDirect, Google Scholar, ProQuest Dissertations and Theses Global, and NU repository), 11 studies could be identified corresponding to the inclusion criteria. It was challenging to find studies investigating the impact of school infrastructure on student learning conducted in Asian countries. Therefore, it can be concluded that the research area is limited on this issue.

Research Implications

This study builds upon the literature in addressing the importance of school infrastructure. It suggest ways for creating a beneficial environment for students' learning process. For example, policymakers and school leaders could refer to this study while creating policies regarding the school infrastructure focusing on school design, expenditure on school infrastructure, and school facilities. The school teachers could refer to this study

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

in the teaching process, paying attention to the classroom design if it is convenient, the temperature in the classroom if it is warm , or the quality of air in the classroom.

The findings can draw attention to the government to the rural schools that are struggling with the deficiency of school facilities. The findings can inform policymakers, school principals and school teachers to the significance of school infrastructure to student performance and could lead to the improvement of the state of school facilities and facilitate taking into account equality in education.

Limitations of the Study and Recommendations for Future Research

This thesis study emphasized many essential points regarding the impact of school infrastructure on student learning. However, there were a number of limitations based on the search keywords, number of databases, and geographical position of the selected studies. The following addresses these limitations and suggests recommendations for future research.

The first limitation can be considered as having limited keywords, which may not cover all studies conducted on this issue in Asian countries. To address this, other researchers could use different terms identifying school infrastructure and types of school facilities in their research. Accordingly, applying additional keywords could bring different results in future research, such as by using the terms “school building”, “physical learning environment”, and “educational infrastructure”. What is more, focusing on a particular physical feature of the school or special type of school facility in systematic literature review is suggested, as it could allow analyzing its influence on student learning.

The second limitation is that the number of databases was restricted. Six databases (ERIC, Web of Science, ScienceDirect, Google Scholar, ProQuest Dissertations and Theses Global, and NU repository) were chosen to review. There could be more studies

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

published in other databases that are not in my list such as Scopus, Academic Search Premiere, or SAGE journals. What is more, there could be more studies in local languages in other repositories. Therefore, it is suggested to review other databases to conduct the systematic review of literature. Moreover, there is a need to conduct empirical studies related to the impact of school infrastructure on student learning especially in Asian countries, as it was problematic to find studies focused on this issue.

Conclusion

This chapter presented an overall summary of the essential findings, the implications, and the limitations and recommendations for future research as related to the impact of school infrastructure on student learning.

Overall, it can be concluded that the school infrastructure, the learning environment, the classroom design play a role in student learning. This thesis study helps fill the gap in literature regarding the impact of school infrastructure on student learning considering Asian countries. As the condition of school infrastructure in some Asian countries, especially in rural areas, leaves much to be desired being double shifted, multigraded or with damaged classrooms. Some rural schools are without indoor toilets or internet connection, and located far from the students' living place causing long travel distance. The studies emphasizing the role of school infrastructure on student learning can draw attention to these issues and bring researchers and practitioners one step closer to a better learning environment.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

References

- Aguilar, J. R. (2019). A review of acoustic design criteria for school infrastructure in Chile. *Revista Ingenieria de Construccion*, 34(2), 115–123.
<https://doi.org/10.4067/S0718-50732019000200115>
- Alsaudi, F. (2015). Effect of the school facilities factor and sport activities factor on parents in terms of private and public school choice at Riyadh City Saudi Arabia. *Universal Journal of Educational Research*, 3(12), 1054–1069. <https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1083247>
- Alswilem, D. A. M. (2019). Saudi English teachers' use of technology in secondary classrooms: Perceptions, barriers, and suggestions for improvement. *Advances in Language and Literary Studies*, 10(6), 168-178.
<https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1255230>
- Altamimi, M. A. (2017). *Saudi Arabian teachers' perceptions of the relationship between the qualities of school facilities and student performance* [Doctoral Dissertation, Saint Louis University] (Publication No. 10680714). ProQuest Dissertations & Theses Global.
- Arayaa, F., Dellb, R., Donosoc, P., Marianovd, V., Mart' mezc, F., & Weintraubea, A. (2012). Optimizing location and size of rural schools in Chile. *International Transactions in Operational Research*, 19, 695–710.
<https://doi.org/10.1111/j.1475-3995.2012.00843.x>
- Ariani, M. G., & Mirdad, F. (2016). The effect of school design on student performance. *International Education Studies*, 9(1), 175-181.
<https://files.eric.ed.gov/fulltext/EJ1086689.pdf>

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

- Balamayuranathan B. (2019). The role of language laboratories in effective English language teaching. *Language in India*, 19(1), 44–49.
- Barrett, P., Davies, F., Zhang, Y., & Barrett, L. (2015). The impact of classroom design on pupils' learning: Final results of a holistic, multi-level analysis. *Building and Environment*, 89, 118-133.
- Barrett, P., Treves, A., Shmis, T., Ambasz, D., & Ustinova, M., & World Bank (2019). *The impact of school infrastructure on learning : A synthesis of the evidence*. World Bank.
- Belmonte, A., Bove, V., D’Inverno, G., & Modica, M. (2020.). School infrastructure spending and educational outcomes: Evidence from the 2012 earthquake in Northern Italy. *Economics of Education Review*, 75.
<https://doi.org/10.1016/j.econedurev.2019.101951>
- Berry,A. 2002. *Healthy school environment and enhanced educational performance*. The Carpet and Rug Institute (CRI)
- Bokayev, B. (2016). *The Improvement of the Quality of Primary and Secondary Education in Kazakhstan*. Cornell University. <https://hdl.handle.net/1813/45565>
- Cele, N. (2016). *The impact of effective schools infrastructure and facilities management on learners and educators*. [Master’s thesis, University of Kwazulu Natal].
- Chan T. C. (1988). The aesthetic environment and student Learning. *School Business Affairs*, 54(1), 26-27.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

- Conlin, M., & Thompson, P. N. (2017). Impacts of new school facility construction: An analysis of a state-financed capital subsidy program in Ohio. *Economics of Education Review*, 59, 13–28. <https://doi.org/10.1016/j.econedurev.2017.05.002>
- Cuesta, A., Glewwe, P., & Krause, B. (2016). School infrastructure and educational outcomes: A literature review, with special reference to Latin America. *Economia*, 17(1), 95–130.
- Darling-Hammond, L. (2000). Teacher quality and student achievement. *Education policy analysis archives*, 8, 1.
- Dogan, M. F., & Dogan, Z. (2018). A study of the 4th grade students in primary school through the compositions of their opinions about the classroom environment they want to be in. *Universal Journal of Educational Research*, 6(11), 2509–2514. <https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1195761>
- Empirical Research: Definition, Methods, Types and Examples. (n. d.) <https://www.questionpro.com/blog/empirical-research/>
- Erickson, P. (2018). Do school facilities affect student learning? (Part 3 of 3). *American School & University*, 90(5), 29.
- Fisher, D., Frey, N., Rothenberg, C. (2008). *Content-Area Conversations: How to Plan Discussion-Based Lessons for Diverse Language Learners*. Alexandria, VA: ASCD.
- Jones, N. R., Jones, A., van Sluijs, E. M., Panter, J., Harrison, F., & Griffin, S. J. (2010). School environments and physical activity: The development and testing of an audit tool. *Health & Place*, 16(5), 776-783.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

- Kariuki, K. I., & Ndani, M. N. (2019). Adequacy of school infrastructure and quality of early childhood education – The case of Nakuru County, Kenya. *European Journal of Education Studies*. 5(12), 132-143.
- Kurmangaliyev, A. (2019). *The impact of ICT on the teaching and learning processes of rural schools in Kostanay Region* (Accession No. nur.123456789.4310) [Master's thesis, Nazarbayev University]. Nazarbayev University Repository.
<https://nur.nu.edu.kz/handle/123456789/4310>
- Kyriakides, L., Stylianou, A., & Eliophotou Menon, M. (2019). The link between educational expenditures and student learning outcomes: Evidence from Cyprus. *International Journal of Educational Development*, 70, 1-9.
<http://www.sciencedirect.com/science/article/pii/S0738059318307661>
- Lewinski P. (2015). Effects of classrooms' architecture on academic performance in view of telic versus paratelic motivation: A review. *Frontiers in psychology*, 6, 746.
<https://doi.org/10.3389/fpsyg.2015.00746>
- Madani, R. (2019). Analysis of educational quality, a goal of Education for All policy. *Higher Education Studies*, 9(1), 100-109.
- Matson, W. I. (2020). A Theory of Justice by John Rawls. *Salem Press Biographical Encyclopedia*.
- Ministry of Education and Science of the Republic of Kazakhstan. (2016). *State Programme for Education and Science Development for 2016-2019*. Astana: Ministry of Education and Science of the Republic of Kazakhstan.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

- Mokaya, Z. M. (2013). *Influence of school infrastructure on students' performance in public secondary schools in Kajiado County, Kenya* [Master's thesis, University of Nairobi].
- Mokhtarmanesh, S., & Ghomeishi, M. (2019). Participatory design for a sustainable environment: Integrating school design using students' preferences. *Sustainable Cities and Society*, 51. <https://doi.org/10.1016/j.scs.2019.101762>
- Nepal, B. (2016). Relationship among school's infrastructure facilities, learning environment and student's outcome. *International Journal for Research in Social Science and Humanities Research*, 2(5), 44-57.
- OECD/The World Bank (2015), *OECD Reviews of school resources: Kazakhstan 2015*. <http://dx.doi.org/10.1787/9789264245891-en>
- Omenyo, R. (2017). *The role of the school library in teaching and learning: A case study of a public basic school in Accra, Ghana*. [Master's Thesis, University of Cape Town] Networked Digital Library of Theses & Dissertations. <http://hdl.handle.net/11427/23393>
- Pons, A., Amoroso, J., Herczynski, J., Kheyfets, I., Lockheed, M., & Santiago, P. (2015). *OECD reviews of school Resources : Kazakhstan 2015*. OECD
- Rahim, B. (2018). School resources and learning outcomes: An empirical study of rural public schools. *Excellence in Education Journal*, 7(2), 3–41. <https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1208673>
- Ruhyana, N. F., & Aeni, A. N. (2019). Effect of educational facilities and infrastructure in primary schools on students' learning outcomes. *Elementary School Forum*

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

(*Mimbar Sekolah Dasar*), 6(1), 43–54.

<https://eric.ed.gov/contentdelivery/servlet/ERICServlet?accno=EJ1265618>

Saadon, S., Rambely, A. S., & Suradi, N. R. M. (2011). The role of computer labs in teaching and learning process in the field of mathematical sciences. *Procedia - Social and Behavioral Sciences*, 18, 348–352.

<https://doi.org/10.1016/j.sbspro.2011.05.049>

Sagintayeva, A., Bridges, D., McLaughlin, C., Mehisto, P., Drummond, M. J., Ayubayeva, N., Kishkentayeva, M., Kulakhmetova, A., Sadvakassova, M., Gasskov, V., Ganimurat, N., Canning, M., Finney, J., Jones, D., McGuinness, A., Harvey, D., Bilyalov, D., & Sagyndykova, Z. (2014). *Development of Strategic Directions for Education Reforms in Kazakhstan for 2015 – 2020*. Nazarbayev University.

<http://ezproxy.nu.edu.kz:2232/handle/123456789/335>

Sharifullah, K., Hwang, G., Abbas, M., & Rehman, A. (2019). Mitigating the urban–rural educational gap in developing countries through mobile technology-supported learning. *British Journal of Educational Technology*, 50 (2), 735–749

<https://doi.org/10.1111/bjet.12692>

Shell, S. (2015). *Effects of the physical environment on teacher satisfaction with indoor environmental quality in early learning schools*. (Publication No. 5-2015) [Master’s thesis, University of Nebraska-Lincoln].

Shmis, T., Ustinova, M., Chugunov, D., & World Bank. (2020). *Learning environments and learning achievement in the Russian Federation: How school infrastructure and climate affect student success*. *International development in focus*. World Bank.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

Stapp, A. (2018). Alternative seating and students' perceptions: Implications for the learning environment. *Georgia Educational Researcher*, 14(2), 36-50.

<https://doi.org/10.20429/ger.2018.140204>

<https://digitalcommons.georgiasouthern.edu/gerjournal/vol14/iss2/4>

Suryadarma, D., Suryahadi, A., Sumarto, S., & Rogers, F. H. (2006). Improving student performance in public primary schools in developing countries: Evidence from Indonesia. *Education Economics*, 14(4), 401-429.

https://www.researchgate.net/profile/Sudarno_Sumarto/publication/24079203_Improving_Student_Performance_in_Public_Primary_Schools_in_Developing_Countries_Evidence_from_Indonesia/links/0c96051a514c5e3df4000000/Improving-Student-Performance-in-Public-Primary-Schools-in-Developing-Countries-Evidence-from-Indonesia.pdf

Tanner, C. K. (2008). Explaining relationships among student outcomes and the school's physical environment. *Journal of Advanced Academics*, 19(3), 444–471.

Tanner, C. K. (2013). A Case for schoolhouse aesthetics. *Educational Planning*, 21(1), 32–38.

Tarun, S., Arora, M., Rawal, T., & Neelon, S. (2017). *An evaluation of outdoor school environments to promote physical activity in Delhi, India*.

<https://doi.org/10.1186/s12889-016-3987-8>

UNICEF. (2009). *Manual child-friendly schools*.

https://www.unicef.org/publications/index_49574.html

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE

United Nations Educational Scientific Cultural Organization (2009). *Policy guidelines on inclusion in education*. <http://unesdoc.unesco.org/images/0017/001778/177849e.pdf>

United Nations (n. d.). *United Nations Statistics Division – Standard Country and Area Codes Classifications* <https://unstats.un.org/unsd/methodology/m49/>

Wang D., Song C., Wang Y., Xu Y., Liu Y., & Liu J. (2020). Experimental investigation of the potential influence of indoor air velocity on students' learning performance in summer conditions, *Energy and Buildings*, 219, 1-17. <https://doi.org/10.1016/j.enbuild.2020.110015>.

Wodon, Q. (2016). *School infrastructure in Paraguay : Needs, investments, and costs*. World Bank. <http://hdl.handle.net/10986/22725>

Wollscheid, Sjaastad, Tømte, (2016). The impact of digital devices vs. Pen(cil) and paper on primary school students' writing skills – A research review. *Computers & Education*, 95, 19-35, <https://doi.org/10.1016/j.compedu.2015.12.001>. <https://www.sciencedirect.com/science/article/pii/S0360131515300920>

Yigzaw, G. S. (2019). The role of parents in improving the behavior of school's students in Azena primary school, Ethiopia', *International Journal of Educational Research Review*, 4(3), 334–349. <https://doi.org/10.24331/ijere.573870>.

THE IMPACT OF SCHOOL INFRASTRUCTURE ON STUDENT LEARNING: A
QUALITATIVE SYSTEMATIC REVIEW OF LITERATURE